Externality Slides

Econ 331

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Learning Outcomes/Goals

1. Classify a particular setting as a positive externality, negative externality, or no externality.

2. Compare and contrast the Competitive Equilibrium and the Socially Efficient/Pareto Optimal point in the presence of a positive and negative externality.

Where We Are

- We can use a demand and supply diagram to find a competitive equilibrium.
- We know Pareto Optimal means there are no possible Pareto Improvements.
  - We cannot make one side of the market better without making the other side worse.
- We will hint at some ways to address externalities at the end of these slides.
- We will start with looking at externalities between individuals before looking at externalities in the market.

Externality Example

- Suppose Bill is waiting for the bus, and someone is smoking a cigarette nearby.
- The wind blows the smoke towards Bill, who suffers from having to smell the cigarette smoke.
- Bill did not choose whether or not this person smokes or not, but Bill is affected by that person's choice.
- This impact on Bill is a **negative externality**.

Externality Example 2

- Suppose Bill gets off the bus and as he is walking home Bill is greeted by his neighbor's dog Waldo.
- Bill loves dogs, and feels extra happiness (increased utility) by being able to pet Waldo on his way home.
- Bill was not involved in his neighbor's decision to adopt Waldo from the shelter, but benefits from that decision.
- This benefit to Bill is a **positive externality**.

Externality Definition

An **externality** occurs when a third-party individual who is **not** directly involved in an economic decision incurs a benefit or cost as a direct result of that decision.

Externalities and Pareto Optimal

- Let's go back to the example of Bill and the smoker and suppose the price of a cigarette is $5.
- Suppose Bill's damage from inhaling the smoke from that cigarette is valued at $10.
- Suppose the smoker's willingness to pay to smoke that cigarette is valued at $8.
- **Question**: Does it make sense from a welfare perspective for the smoker to smoke if we only think about Bill and the smoker's surplus from the cigarette?

Externalities and Pareto Optimal

- **No!** The smoker's consumer surplus is $3 and Bill's surplus is -$10 for a total surplus of -$7.
- If the smoker did not smoke, then the smoker's surplus is $0 and Bill's surplus is $0 which is still higher than -$7!
- So why does the smoker choose to smoke?
- The smoker only solves his own utility-maximization problem, he does not take the cost to others (like Bill) into account.
- If he did take those costs into account (internalize the external costs) he would not smoke.

Revisiting Equilibrium as Welfare Maximizing

- When we talked about surplus and market equilibrium, we said each economic agent independently solving their maximization problem led to the competitive, or market, equilibrium.
- We also said this market equilibrium was welfare maximizing, which meant it was Pareto Optimal.
- A key assumption we made was **there are no externalities** in the market.
- When we do have externalities, the competitive equilibrium is no longer Pareto Optimal, as we see in the case of Bill and the smoker.
- In the case of a negative externality, generally the equilibrium quantity is greater than the Pareto Optimal.

Revisiting Equilibrium Example 2

- Suppose you are deciding how many lights to put in your front yard along the sidewalk.
- Your willingness to pay is $10 for the first pair of lights, and then your willingness to pay declines by $2 for each additional pair of lights.
- The price of lights is $4 per pair, so you purchase 8 lights in total, or 4 pairs.
- Now suppose your neighbors benefit from the well-lit sidewalk in terms of walking or just appreciate how it looks. It increases their utility to see your lights.
- Let's say this benefit is $2 per pair of lights in your yard.
- If you accounted for this, you would now purchase 10 lights in total, or 5 pairs.
- In the case of a positive externality, generally the equilibrium quantity is less than the Pareto Optimal.

Shifting the Market to be Pareto Optimal

- How could we “push” or “nudge” the market in both cases to be Pareto Optimal?
- Option 1: We could add a tax on smoking cigarettes or offer a subsidy on sidewalk lights.
  - This would increase the person’s cost of smoking/decrease the cost of lights.
  - Then the person would adjust their behavior towards the Pareto Optimal outcome.
  - This is what we call a **Pigouvian tax/subsidy**.
- This assumes we can exactly figure out the marginal external benefit or marginal external cost.
- This also means we will be implementing a tax in the market, which may be tough to sell politically.

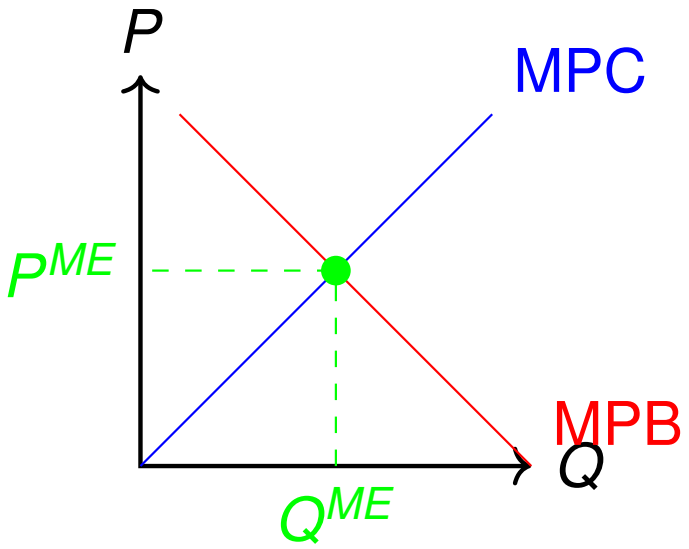
Option 2: The Coase Theorem

- Option 2: We could define that Bill has the right to smoke-free air, and if the smoker wants to smoke he and Bill would need to negotiate and most likely the smoker would need to compensate Bill in order to smoke.
  - This assumes we can define a property right in a well-defined way.
  - We also assume that the cost of negotiation is low and we have complete information.
  - Further, if the smoker has the right to smoke, Bill would have to pay the smoker to stop causing Bill damage by smoking, which feels a bit weird,

Graphing Externalities

- Now we want to be able to use our supply-demand diagram to show that a negative externality results in the market over-supplying a good.
- We also want to show that a positive externality results in the market under-supplying a certain good.
- We need to use the idea that the demand curve is a marginal benefit curve, and supply is a marginal cost curve from our study of demand and supply.
  - We talked about this is the Surplus slides and in the Firm Supply slides.

Graphing Externalities

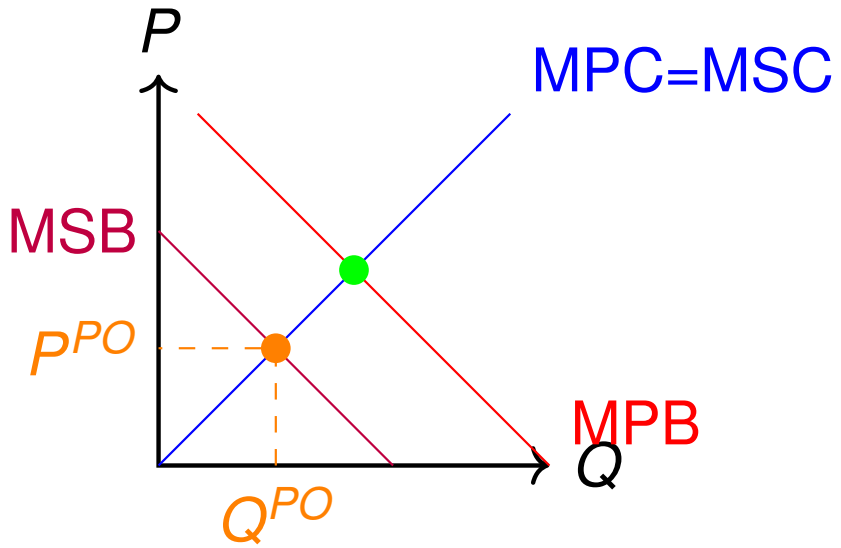


- I have drawn a supply and demand diagram representing marginal benefits and costs.
- The demand curve represents the Marginal Private Benefit (MPB) of a certain good.
- The supply curve represents the Marginal Private Cost (MPC) of a certain good.
- The green dot represents the market equilibrium price and quantity.

Graphing Externalities

- In the smoker example, the externality was on the demand side, or consumption, rather than the supply side, or production, of the cigarette.
- The marginal private benefit of smoking a cigarette does not include the harm the smoke did to Bill.
- If the smoker took this marginal external cost into account, the smoker's marginal benefit would be lower.
- That is to say that the Marginal Social Benefit (MSB) is lower than the Marginal Private Benefit (MPB) when we have a negative consumption externality.

Graphing Externalities



- I have left the market equilibrium as the green dot.
- When I plot the MSB curve, which is below the MPB curve, the new point of intersection is now Pareto Optimal at orange dot.
- Note that I did not add any externality on the supply side here, so the MPC=MSC.

Key Takeaways

1. The market equilibrium is where Marginal Private Benefit (MPB)=Marginal Private Cost (MPC).

2. Without any externalities, Marginal External Cost=Marginal External Benefit=0.
   - This means Marginal Social Benefit=Marginal Private Benefit, Marginal Social Cost=Marginal Private Cost.
   - Therefore the market equilibrium is Pareto Optimal.

3. The presence of externalities means the market equilibrium is not Pareto Optimal.

4. The Pareto Optimum point is where Marginal Social Benefit=Marginal Social Cost.