

First Quiz Econ. 4/5535 -Natural Resource Economics

I. An Introduction to NR Economics

1. (6 points) Assume a world that consists of two time periods. Denote the individuals in period 1 as *generation 1*, and denote the individuals in period two as *generation 2*. Assume a world of just two goods, *cases of beer* and copies of the book *David Copperfield*. Further assume individuals in generation 1 are willing to trade beer for books at the rate of 2 cases for one book, and generation 2 is willing to trade beer for books at the rate of one case for one book. Currently each generation has 10 cases of beer and 10 books. Is the current intertemporal allocation of beer and books efficient? Explain. (Assume books and cases of beer are divisible. For example, generation 1 would trade one case of beer for a half of a book and generation 2 would trade a half of a book for a half of a case.)

Answer: No, it is not efficient because it is possible to change the allocation of beer and books between the two generations and make one generation better off without making the other generation worse off. For example, if generation 2 gives generation 1 one book in exchange for one case of beer, generation 2 will remain at the same level of welfare. However, generation 1 will be made better off. How do we know this? Given generation 1's rate at which they are willing to exchange books for beer, if they give up one case of beer they will only need to be compensated a half of a book to remain at the same level of welfare. But in the one to one exchange with generation 2 they receive one book, so generation 1 is made better off by this exchange.

If generation 2 gave generation 1, $3/4$ of a book in exchange for a case of beer, both generations would be better off.

Some additional questions and thoughts about beer, books and these two generations

Identify an efficient allocation of beer and books between the two generations? Generation 1 consumes all of the books, generation 2 all of the books. Are there other efficient allocations? Yes, but no other efficient allocations that can be obtained through voluntary trade given the initial allocation. For example, the allocation would be efficient if Generation 2 had all of the books and all of the beer, but this allocation could not be achieved through trade.

Can we say anything about whether generation 1 is better off or worse off than generation 2? No

Can we say that either generation is happy or sad, or whether efficiency implies happiness? Efficiency does not imply happiness; the allocation could be efficient and everyone could be miserable. If preferences are known, we can determine whether a reallocation will make an agent better or worse off, not whether it will make him or her happy or sad.

Draw some beer/book indifference curves for each generation. Make sure you understand the

distinction between *the rate at which an economics agent is willing to substitute commodity A for commodity B*, and *the rate at which the agent is able to trade commodity A for B*.

In the problem, there was no discussion of prices or markets and no such information is ever required to determine whether a particular allocation is efficient. What we need to determine whether an allocation of beer and books between the two generations is efficient is the quantity of beer and books and the preferences of the two generations for beer and books. Once one has identified the efficient allocation(s) of good, one can then ask whether a market system will achieve an efficient allocation, but this is a separate question.

Note the following: If at the current allocation it is possible to reallocate resources in a way that makes some member of society better off and others member worse off, this does not imply the current allocation is efficient. The current allocation is efficient if the only way to make some members better off requires that other members be made worse off.

2. (4 points) What is an externality? Give an example of an action by one economic agent that affects another economic agent that is not an externality. Explain why your example is not an externality.

Answer: Externalities are a class of market failure. There is an externality if an economic agent(s) does something that directly influences (not indirectly through market prices) some other economic agent(s), but the agent that produced the effect has no incentive to take the effect into account because there is no requirement, incentive, or penalty in place that causes that agent to fully account for the effect.

Make sure you provided a definition of an externality rather than just an example.

A market trade that only affects the trading parties is not an externality but is a voluntary transaction between two (or more) economic agents where both parties are affected. The purchaser of the market good compensates the seller for his or her loss by paying the seller money. In a world of certainty, no parties to a trade can be made worse off by the trade because trades are voluntary and no one would voluntarily do something that made them worse off.

However, a market transaction can involve an externality if the trade affects agents that are not parties to the trade. Such externalities are referred to as *third-party externalities*. An example of a third-party externality is second-hand cigarette smoke.

Social interactions between two people (e.g. dates) that do not affect third parties are actions between two parties that effect both parties, but there is no externality. However, if the social interaction makes some third party better or worse off there is a potential externality.

Some further thoughts on externalities (but not a necessary part of you answer at this time):

When the external effect is positive and the economic agents who produced the effect are compensated, it does not matter for efficiency whether the funds for that compensation are

collected from the agents who benefitted from the action or from some other source. And, when the effect is negative, and the economic agents who produced the effect are forced to pay, on the margin, for the damages produced, it does not matter for efficiency whether the funds collected are paid to the damaged agents. If the producer of the external effect has the correct incentive to take the effects into account there is no externality.

The existence of a negative or positive non-price impact on others is necessary but not sufficient for the existence of an externality. If the allocation is efficient there is no externality, even though there are external effects. For example, if smoking is taxed such that the efficient amount of secondhand smoke is produced, the efficient amount of smoke is positive and the revenues collected from the smoking tax/fine are not paid to those damaged by the smoke, there is no externality even though some individuals continue to be injured by the secondhand smoke. Consider a second example. If the efficient amount of secondhand smoke is achieved through a regulation, there is no externality, and people are still adversely affected by the remaining secondhand smoke.

Consider a world with two individuals: you and I, where smokers have the right to smoke, I smoke, and you hate secondhand smoke. If you bribe me to reduce the amount I smoke to an efficient amount, there is no externality, even though you are made sick by the remaining smoke.

Blowing cigarette smoke at your neighbor can be an externality, so can a factory polluting the neighborhood. Externalities result when property rights are not well defined.

We can talk about

producer - producer externalities
producer - consumer externalities
consumer - consumer externalities
consumer - producer externalities
and

spillovers (If everyone is affecting everyone else (e.g., car pollution).

Smoking is a good example of an externality. Suppose $U^A = U^A(X^A, Y^A)$, where Y^A is the

consumption of cigarettes by individual A and $U^B = U^B(X^B, Y^B, Y^A)$, where $\frac{\partial U^B}{\partial Y^A} < 0$ individual

B is adversely affected by A's smoking (this could be the case even if individual B enjoys his own smoking). If individual B cannot control the amount of smoke he or she receives from individual A (that is, she lacks certain property rights), then a competitive market will not result in an efficient allocation of resources. The efficiency conditions in the presence of externalities are different from the efficiency conditions in the absence of externalities. Pollution and environmental problems are good examples of externality type market failures.