

ECON-A4000 - Economics of Global Challenges

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Return method: through mycourses by the deadline

Problem Set 2: Question 4

We continue a with the topic of Lecture 7 in which we discussed patents and the innovation rents that they generate. Here is a (*video*) on intellectual property rights. I would like you to replicate innovation incentives discussed in the video using a specific example.

1. The developer knows that the annual demand for the drug follows the formula $Q = AP^\epsilon$ where $A > 0$ is a constant, Q and P are the quantity and the price, respectively, and $\epsilon < 0$ is a constant. During the lectures we discussed that the patent monopoly would optimally set a price following a rule that connects the price for the product, the unit cost production (i.e., marginal cost), and the elasticity of demand. It turns out the elasticity for the demand formula is ϵ . The innovator knows that the unit cost is $C = 400$ and that the elasticity is $\epsilon = -2$. Find the optimal price for the patented product.
2. The innovator estimates that $Q = 10$ at the optimal price that you found in the previous item. That is, 10 units will be sold annually at the monopoly price. What is the annual innovation rent?
3. These annual rents should then be transformed into a present value sum to be compared with the innovation cost. If the patent duration is 20 years, we would like to find the size of the innovation cost that could be covered with these rents. That is, please find how much the innovator could invest at most without making losses. Interest rate in the economy is 4%.
4. What happens when the patent expires?

5. How big is the deadweight loss from the patent protection in total?
Hint: look at the consumer surplus lost due to innovation rents.