DEPARTMENT OF ECONOMICS

MICROECONOMICS, SPRING 2010

PROBLEM SET 8: EXTERNALITIES AND MONOPOLY

DUE in Class on March 31 (Skreta Sections) or April 1 (Bowmaker and Collard-Wexler Sections)

1. SHORT ANSWER PROBLEMS

1. Using a diagram, define what is meant by a negative externality.

2. Describe three possible solutions to externalities.

3. True or false. The marginal revenue for a monopolist can be negative.

4. Derive the expression for the price over marginal cost markup \((p - mc)/p\). Use this expression to compute the markup for the following two orange juice brands, where the (estimated) elasticities of demand for Tropicana OJ and Minute Maid are -2.5 and -4, respectively.

5. Suppose a monopolist’s marginal cost is \(MC = 10\) per unit, and their average variable cost \(AVC = 5\) per unit, and they are selling the good in the market for \(p = 9\). Should this firm sell more or less of the good?

2. EXTERNALITIES

Suppose that we want to levy a Carbon Tax, i.e. a tax on fossil fuels, since when fossil fuels are used in manufacturing processes, they create carbon dioxide and other greenhouse gases that contribute to Climate Change. The point of the exercise is to investigate what the “right” policy to reduce carbon emissions might look like.

The demand curve for fuel is:

\[ Q^D(p) = 20 - 2p \]

The private cost of producing the fuels that emit carbon dioxide is:

\[ C^P(Q) = \frac{1}{6} Q^2 \]

Atmospheric scientists have computed that the environmental cost of fuels (due to greenhouse gas emissions) is:

\[ C^E(Q) = \frac{1}{12} Q^2 \]

1. What is the market clearing price and quantity if only the private cost is considered?
2. What is the efficient price and quantity if both the private cost and social costs are considered?

3. What is the deadweight loss if firms does not take into account the externality? (Note: it helps to draw a diagram and label it, then get the number!)

4. Suppose the government imposes a Carbon quota $\bar{Q}$. At which level should the quota $\bar{Q}$ be set?

5. How much should the government tax this good to arrive at the efficient quantity of carbon?

6. Do the private costs of producing carbon fuels have economies or diseconomies of scale? Explain what would justify the economies you found?

7. Do the external costs of carbon dioxide have economies or diseconomies of scale? Why would we believe the economies that you found?

8. Where does the demand curve for Carbon Fuels come from? In which part of the class have we seen how the price of this fuel affects demand?

9. Lead is used in many manufacturing processes, such as the historic use of lead in paint. The problem is that lead seeps into the topsoil and contaminates the ground, such as the area of the Gowanus canal in Brooklyn (which has recently become a superfund site which means that federal money will be used to clean it up), making the area unfit for human habitation. Explain the difference in the economic problem between carbon dioxide and an alternative source of pollution due to lead contamination.

10. What is the advantage of quotas over taxes? What is the advantage of taxes over quotas?

3. Market Power and Monopoly

Suppose that E-tronics faces market demand function for HD Televisions that is given by

$$Q^d = 100 - 2P$$

Its cost function is $TC = 50 + 10Q$. E-tronics is a monopoly in this market.

1. What are the fixed cost, variable costs, average costs and marginal costs?

2. How much will it choose to produce and what will be the market price for HD TVs?

3. What is consumer surplus at the monopoly price?

4. What is the monopolist’s supply curve?

5. What would price and quantity in this market be if E-tronics would behave as in perfect competition?

6. What is the consumer surplus in the case of perfect competition? Why is it higher than that in the monopoly case. What is the social cost of monopoly.