

PROBLEM SET 2

Due Thursday, March 9, 2000 in class
(Late assignments will not be graded)

1. Assume there are three polluting firms in the economy with marginal benefit curves given by: $MB_1 = 75 - (5/4)q_1$ for firm 1, $MB_2 = 75 - q_2$ for firm 2, and $MB_3 = 75 - (3/4)q_3$ where q_i ($i=1,2,3$) is the amount of emissions produced by each firm.
 - a) Find the aggregate marginal benefit curve. (Hint: Find the horizontal sum of the individual MB curves). Draw each of the four curves in a single graph.
 - b) Which firm is more efficient in reducing pollution? Explain.
 - c) If the marginal social cost curve is given by $MSC = 30 + Q$, what is the optimal level of emissions (Q^*) to be produced? Show both the MSC curve and Q^* on the same graph.
 - d) What is the optimal tax to be levied to achieve Q^* ? Given this tax, find the amount of emissions produced by each firm, q^*_1 , q^*_2 , and q^*_3 . Show these levels on the same graph.
 - e) Suppose that instead of a tax, the government decides to use a uniform standard equal to $Q^*/3$. What is the level of emissions produced by each firm? Show it on the graph.
 - f) Compare the level of emission produced by each firm under the tax and under the uniform standard. Which firm produces more/less than before? Comment.
 - g) Now, suppose that the government allocated $Q^*/3$ permits and allowed these firms to trade permits. What would be the final level of emissions produced by each firm? What would be the gains from trade?

2. Write a brief essay about the following:

Motor vehicles, power plants, factories, chemical solvents, combustion products from various fuels, and some consumer products release nitrogen oxide (“NOX”) and volatile organic compound gases (“VOCs”) that react with sunlight to produce ground-level ozone. Ground-level ozone is the primary ingredient in smog and can have harmful effects on human health and the environment.

In choosing between incentive-based instruments (taxes) and direct control measures (standards) to reduce ozone-causing pollution, what considerations would influence the EPA’s decision in favor of one type of policy or the other? Be sure to describe the welfare implications under the two types of policies.