WUR/EEES 21306
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Homework 9&10
Due: Dec 6 (before class)
5 points per question
10 points total

9. Optimal pollution reductions with two firms (NB: Not my favorite choice of question, but later professors will ask you to do problems like this).

   Firm A has Total Abatement Cost (TAC) function of $C_A = 50 + 3Z_A^2$. Firm B has a TAC of $C_B = 75 + 2Z_B^2$. The government is targeting a total of Z=50 units of reduction.

   (a) (1 pt) What are the costs to A and B for $Z_A = Z_B = 25$ units?

   (b) (1 pt) What are the values of Z_A and Z_B for a cost-effective reduction in pollution that minimizes total costs subject to $Z = 50$?

   (c) (1 pt) What are the marginal costs for each? What are total costs?

   (d) (2 pts) Now that you've done these calculations, tell me (three sentences maximum) what you'd say to the minister of the environment if he asked you to find the optimal amounts of pollution for two (or 40 or 4,000) Dutch firms.

10. We will compare emissions taxes to permits for pollution from CO_2-emitting power plants, with and without perfect information. NB: Make a LARGE graph (one half A4) so you have enough space; make sure you label curves.

    (a) (1 pt) P is the price of power; Q is the quantity on the market. Draw a demand curve and supply curve that reflects the private cost of selling power; label it S_P. Now add a supply curve that includes the social cost of CO_2 emissions (make it parallel to S_P); label it S_S. On the vertical price axis, label equilibrium prices P_P for the private price and P_S for the social price. On the horizontal axis, label equilibrium quantities Q_P for the quantity sold when prices only reflect private costs and Q_S when they include social costs.

    (b) (0.5 pt) Does the imposition of an accurate Pigouvian tax first cause P_P to move to P_S or Q_P to move to Q_S?

    (c) (0.5 pt) Does the imposition of an accurate limit on emissions (cap and trade) first cause P_P to move to P_S or Q_P to move to Q_S?

    (d) (1.5 pts) Now assume that the tax is set too high. Draw a new supply curve, S_W. Is the quantity of power produced too high or too low, relative to Q_S? Who gains, within the power industry, from the tax being too high?

    (e) (1.5 pts) Now assume that the (cap and trade) permit ceiling is set too low. Draw a vertical line showing this limit. Label its intersection with the quantity axis Q_X. Who gains, within the CO_2 emitting industry, from permits being too scarce?