Economics 3250 Dr. Lozada
Spring 2010 Exam 2

Do Not Turn This Page Over Until You Are So Instructed!

This exam has 25 points. There are six questions on the exam. The number of points for each question is shown next to the question number.

Put your answers to the exam in a blue book.

You have **one hour** (that is, until **2:25pm**) to take this test. After the test is over, I'll lecture until the regular class period ends.

Answer the questions using as much precision and detail as the time allows. Correct answers which are unsupported by explanations will not be awarded points.

Answer all of the following six questions.

1. **[5 points]** Draw a graph with "abatement" on the horizontal axis and "$/unit" on the vertical axis.

   (a) Draw a "Marginal Abatement Cost" curve on this graph, then answer: if a tax on pollution (that is, on non-abatement) is imposed, what level of abatement does the firm choose, and how much tax is collected?

   (b) On the same graph, or on a new graph with "abatement" on the horizontal axis and "$/unit" on the vertical axis, draw a "Marginal External Cost" curve and indicate the socially optimal level of abatement.

2. **[3 points]** In a study of pollution control regulations, your book reports that the Net Benefits of:

   - technology-based standards was −$60,000,000 in 1984 dollars;
   - ambient-based standards was +$1,400,000 in 1984 dollars; and
   - benefits-based standards was +$31,100,000 in 1984 dollars.

   Why do these numbers make sense?

3. **[5 points]** Thoroughly discuss the implications of Figure 1. You need not graphically explain how to derive Figure 1, but you should explain what economic situations it describes, and what it implies for economic policy. Label Figure 1's curves; show important points on it; and include it with your exam answers.

4. **[5 points]** Illustrate the Hotelling Rule on a graph with (instantaneous) "quantity extracted" on the horizontal axis and (instantaneous) "profit" on the vertical axis.

5. **[3 points]** Argue that the following statement is false (whether you agree with it or not):

   > Business and industry are the ultimate cause of all pollution problems.

6. [**4 points**] What economic inefficiency is created by municipal solid waste? Name two economic policy instruments which could alleviate the inefficiency. Explain.

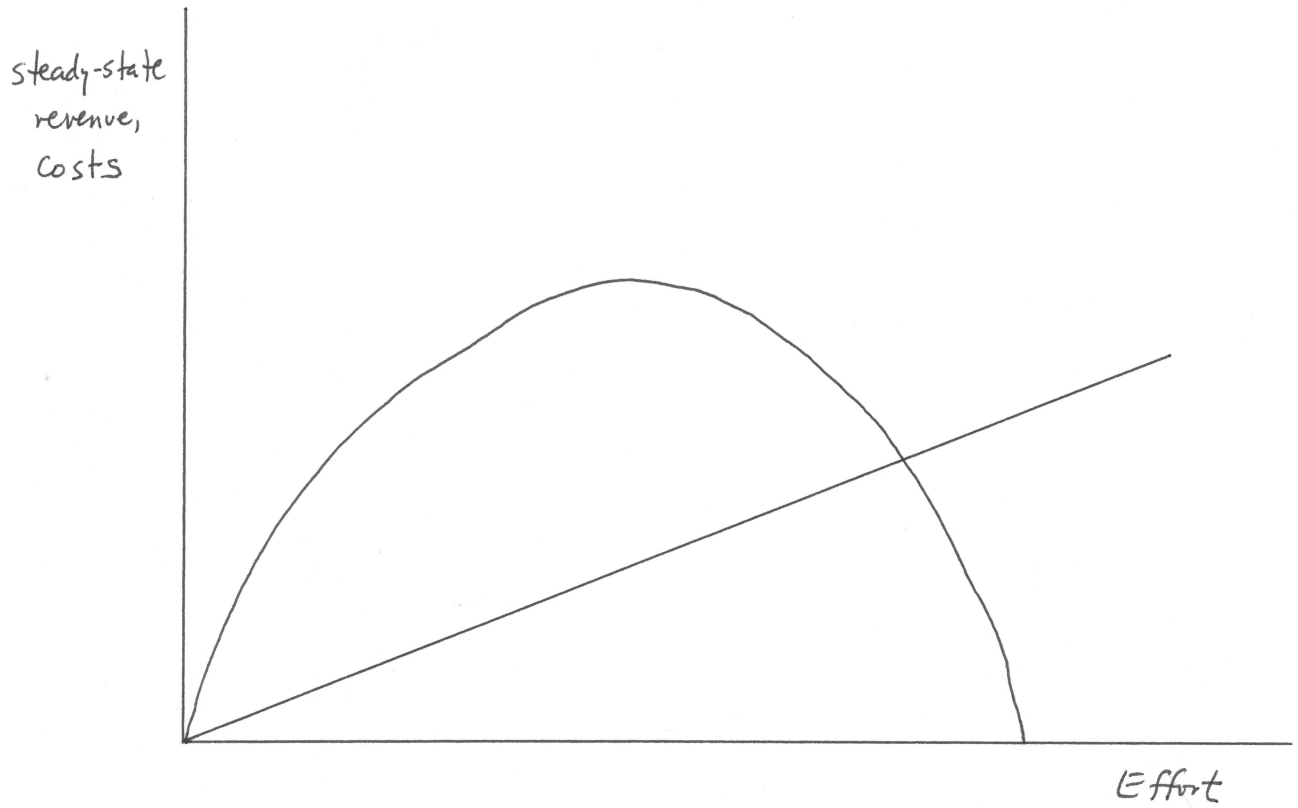
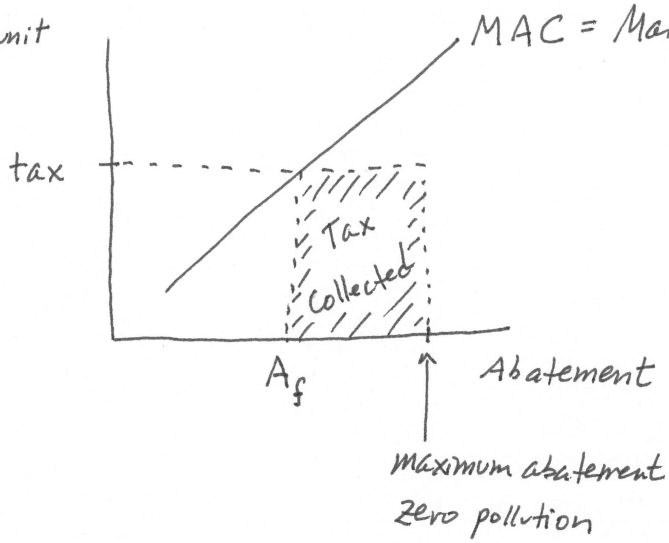


Fig. 1

Answers to Exam 2, Econ 3250,

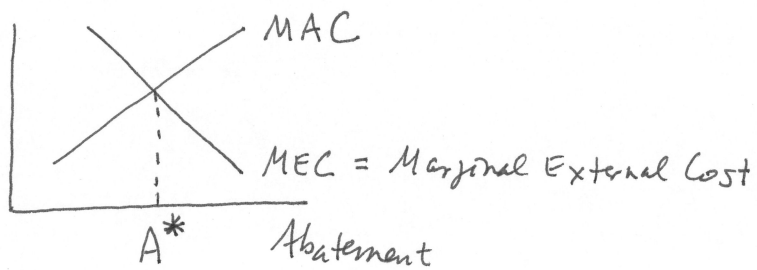
Spring 2010

① a) $/unit



The tax is levied on non-abatement, that is, on the extent that abatement falls short of the "maximum abatement" level. This is why the tax revenue is measured starting at the "maximum abatement" level and going to the left. The firm picks level of abatement "A" equal to A_f because for $A < A_f$, the marginal cost to abate (MAC) is less than the tax (so they choose to abate), but for $A > A_f$, MAC > tax, so they choose to pay the tax rather than abate and pay MAC.

b) $/unit



MEC rises as pollution increases, so as abatement increases, MEC falls. If $A < A^*$, abatement should rise because the benefits to increasing abatement are MEC, which exceeds the cost of increasing abatement, MAC. →

If $A > A^*$, abatement should fall because MEC (abatement's benefits) falls short of MAC (abatement's costs).

The reason that MEC represents the benefits of abatement is that if abatement goes up by a marginal unit, pollution goes down, decreasing external cost, which is a benefit.

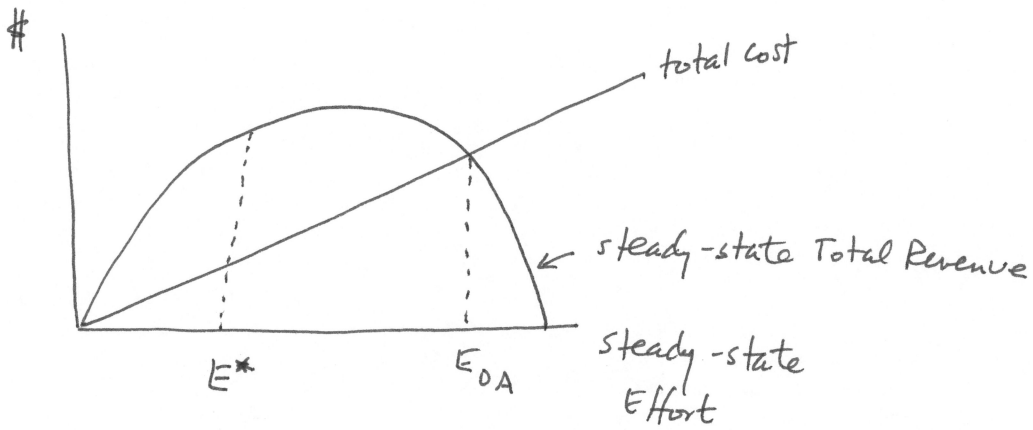
(2)

Technology-based standards often lead to inefficiency because they do not directly target pollution, which is what causes the problem; they impose (usually) the same requirements on all producers, despite the fact that some producers may find it much cheaper to control pollution than others; and they give little scope for firms to discover better ways of controlling pollution on their own.

Ambient-based standards do directly target pollution, so they improve upon technology-based standards in that sense. However, they do not take control costs into account.

Benefits-based standards, by taking both MNPB and MEC (or MAC and MEC) into account, are efficient by design. So they would be expected to have the highest net benefits.

(3)

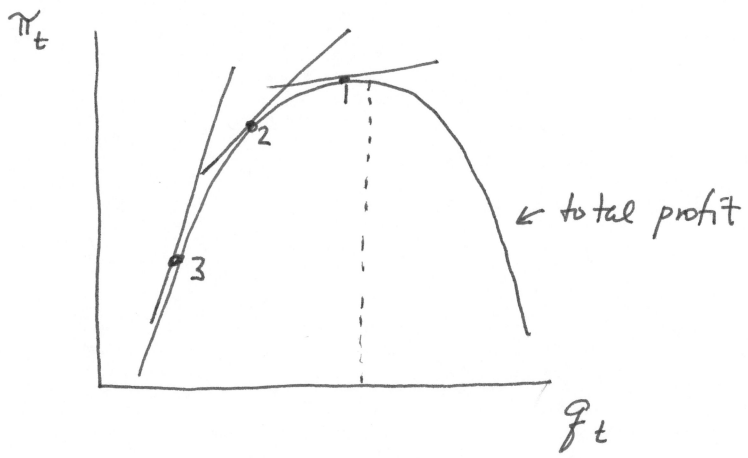


The open-access level of fishing effort would be E_{OA} since that makes total cost = total revenue and hence profit "π" equal to zero. If $\pi < 0$, firms would be leaving the industry, and if $\pi > 0$, they would be entering the industry (π represents pure economic profit), so the only steady state is where $\pi = 0$.

E^* is better for the industry than E_{OA} because π at E^* is a maximum; and E^* is better for the fish stocks than E_{OA} because $E^* < E_{OA}$, so E^* results in more fish.

So an open-access unregulated fishery is bad (inefficient).

(4)



The Hotelling Rule states that marginal profit ("$\Delta\pi$") rises at the rate of interest. $\Delta\pi$ is the slope of the total profit curve. So as time goes on, the position on the graph changes from positions near "1" to those near "2" and later "3." Thus at early dates, π is close to its instantaneous maximum, but as time goes on, π falls. This is present-discounted-value-maximizing because π in early years is more valuable than π in later years.

(5) Consumer demand for products is the ultimate reason those products are produced. Often (though not always), consumers buy more from companies which sell at lower prices — lower prices made possible by not abating pollution. So business and industry are not the sole ultimate cause of pollution.

Optional: Government may also pollute, either directly, or indirectly via its demand for commodities whose manufacturing causes pollution. Consumers also directly cause some pollution, especially air pollution from cars and municipal solid waste.

(6)

The inefficiency is too much municipal solid waste created by firms and households, due to under-pricing of marginal solid waste disposal. Such underpricing is common for residential solid waste, where governments supply the disposal service. It is uncommon when private firms dispose of waste, although such firms may be paying inefficiently low landfill dumping fees.

Policy instruments which could alleviate the inefficiency include:

a) Materials levy: an input tax on non-recycled materials

b) Product Charge: an output tax proportional to the product's waste disposal and pollution impact

c) Waste Disposal Charge: paid by the ultimate consumer

d) Deposit-Refund System: resembles a product charge levied on the consumer plus a waste disposal subsidy (encouraging proper disposal)

e) Marketable Permits: for example, for minimum recycled content of newsprint, or maximum non-recycled content of newsprint.