ECON/FRE 374 – Problem Set 6 - Solutions

Due: In class on Friday, November 28th 2008

Instructions: a) Your grade on this problem set will be determined by *randomly* grading a single problem from the set below. It is thus important to do each question carefully as any one problem could determine your grade. b) Problem sets are to be handed in at the beginning of class. Please do not upload your problem sets in webct. c) Any problem set received after the time it is due will not be graded. d) Please label and mark all graphs clearly.

Questions (each question is potentially worth 10 points):

1) As a study on the economics of wildlife, a group of students found that the total benefit derived by hunting African elephants for their ivory was given by $200X - (X^2)/2$ and the total benefit from hunting rhino for their horns was $200X - (3(X^2))/2$. The marginal cost of hunting elephants is equal to the marginal cost of hunting rhinos which equals $20 + X$.

   a) Find the optimal quantity of rhinos and elephants that should be hunted as well as the prices.

   $MB_E = 200 - X$
   $MB_R = 200 - 3X$
   $MC = 20 + X$

   $E^* = 90$, $P_E^* = 110$
   $R^* = 45$, $P_R^* = 65$

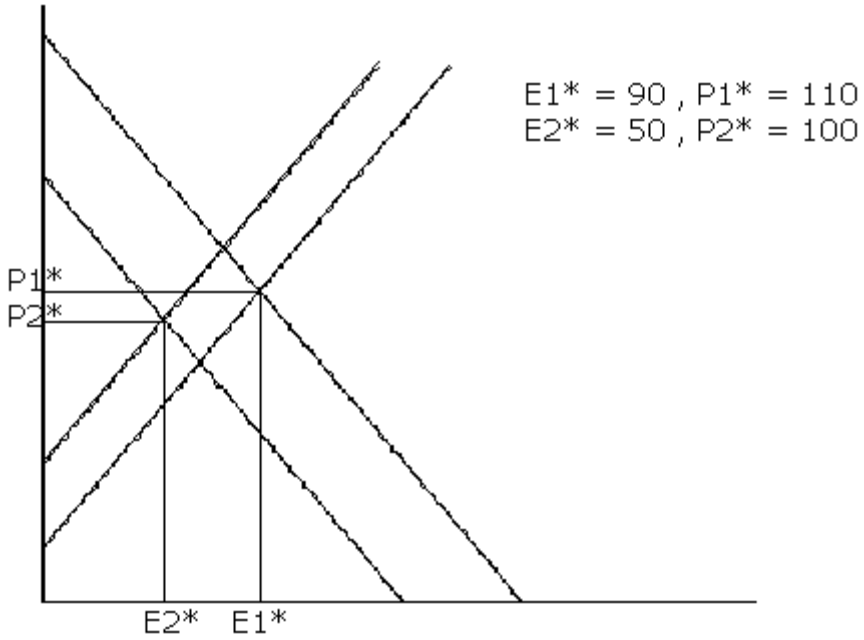
   Conservation groups decided a ban would help reduce over hunting. After the ban, the marginal cost of hunting elephants and rhinos to $50 + X$. The ban also reduced the total benefit of elephant ivory to $150X - (X^2)/2$ and the total benefit of rhino horns to $150X - (3(X^2))/2$.

   b) What is the new optimal quantity and price for elephant ivory and rhino horns?

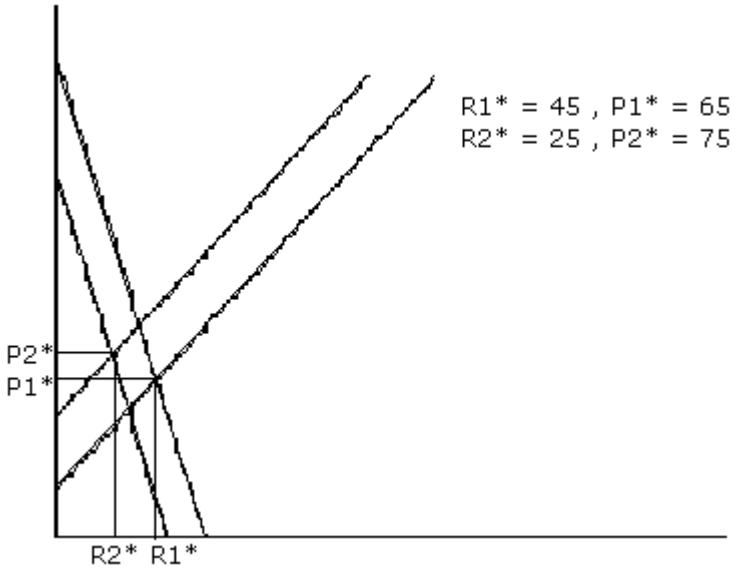
   $MB_E = 150 - X$
   $MB_R = 150 - 3X$
   $MC = 50 + X$

   $E^* = 50$, $P_E^* = 100$
   $R^* = 25$, $P_R^* = 75$

   c) Draw a graph for elephant ivory that shows these quantities and prices before and after the ban.



d) Draw a graph for rhino horns that shows these quantities and prices before and after the ban.



e) Why did the ban on ivory have a greater effect on quantity than the ban on rhino horns?

There are good substitutes for ivory (being a luxury good) which yield a more elastic demand curve so small price increases lead to large reductions in price. Rhino horns are commonly used for their medicinal purposes and do not have substitutes. Thus an increase in prices does not lead to such a dramatic drop in demand.

2) Discuss, using one or more well-labeled diagram(s), at least three possible policy instruments that can be used to solve the open-access problem in a logistic fishery model. Point out the main advantages and disadvantages of *each* instrument. (20 points)

Policies to solve the open-access inefficiency (move from A to B see graph below):

- Taxes on input => TC=(c+t)e
- Taxes on harvest => TR=(p-t)y(e)
- Licence fee => TC=f+ce
- Quotas/ output restrictions
- Input restrictions

Students should also include the advantages and disadvantages of each instrument with issues about enforcement, and possibly by-catch and discarding of fish.