

ECN 371: Exercise set 3

Exercise sets are not to be handed in. At the same time as exercises are put on the WEB page, so are the associated suggestions for answers.

In an economy there are 100 firms, 50 firms with technology A and 50 firms with technology B. The marginal abatement costs of the two firms are:

– type A: $MAC_A = 10 - z_i$

– type B: $MAC_B = 5 - \frac{1}{2}z_i$

The total marginal economic cost (marginal damage) function is $MEC = \frac{1}{100} \sum_{i=1}^{100} z_i$ where total emissions, $Z = \sum_{i=1}^{100} z_i$, i.e. the sum of the emissions of all firms.

- (a) Show that the optimal emission level, $Z^* = 400$
- (b) Find the optimal tax rate, t^*
- (c) What is the optimal emission level for the representative firm in each of the categories, A and B?

Suppose that the aggregate optimal emission level, $Z^* = 400$, is equally "grandfathered out to each firm, i.e., each firm receives an initial emission quota, $\bar{z}_i = 4$.

- (d) Which type of firm is the seller and which type of firms is the buyer of emission quotas (permits) in this case? Justify your answer.
- (e) What is the total trade volume in question (d), and the resulting quota price, p_z , per unit of z_i ?
- (f) Which of the two systems, emission taxes or tradable emission permits, would the two categories of firms prefer. Justify your answer.
- (g) What can you conclude about the differences or similarities between an emission tax and a tradable emission permit system at the margin?
- (h) Suppose that the institution responsible for administering the quota market put a brokerage fee on the sale of quotas (a percentage of p_z). How would such a fee influence the trade volume. Would it matter if the same fee was put on quota purchases?