Solution to Quiz 2

ENVIRON 805K

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1.

Hedonic Price Method infers the value placed on specific characteristics of goods based on the observed price of a bundle of characteristics.

Consider the house market. Each house can be characterized by a single variable, z, which we will assume represents air quality levels. We are interested in how the price of a house varies with the pollution level. In other words, we are interested in $p(z)$, the house price as a function of air quality levels. This price function is an equilibrium concept, resulting from the interaction of supply and demand. The change in air quality will cause the change in housing price. Therefore, we can use the marginal change in housing price to value the clean air.

We can use the housing price, the air quality index, and other control variables representing the characteristics of the house, like number of bedroom and bathroom, size, etc.

(*You can refer the Problem Set 3 Q3.*)

2.

See Figure 1.

(a)

$$MS(e) = \begin{cases} 10 - 2e, 0 \leq e \leq \frac{5}{2} \\ 8 - \frac{6}{5}e, \frac{5}{2} \leq e \leq \frac{20}{3} \end{cases}$$

(*You can refer to the numerical example on page 246 in your English-version textbook.*)

(b)

Let $MS(e) = MD(e)$, we have $e^* = 4$ and $p^* = MD(e^*) = 3.2$.

3.

Suppose at the equilibrium, Firm 1 emit e_1 and Firm 2 emit e_2. Then, we have

$$\begin{cases} e_1 + e_2 = 5 \\ 10 - 2e_1 = 5 - 3e_2 \end{cases}$$

The second equation indicates that the marginal saving of each firm should be equal at the equilibrium.

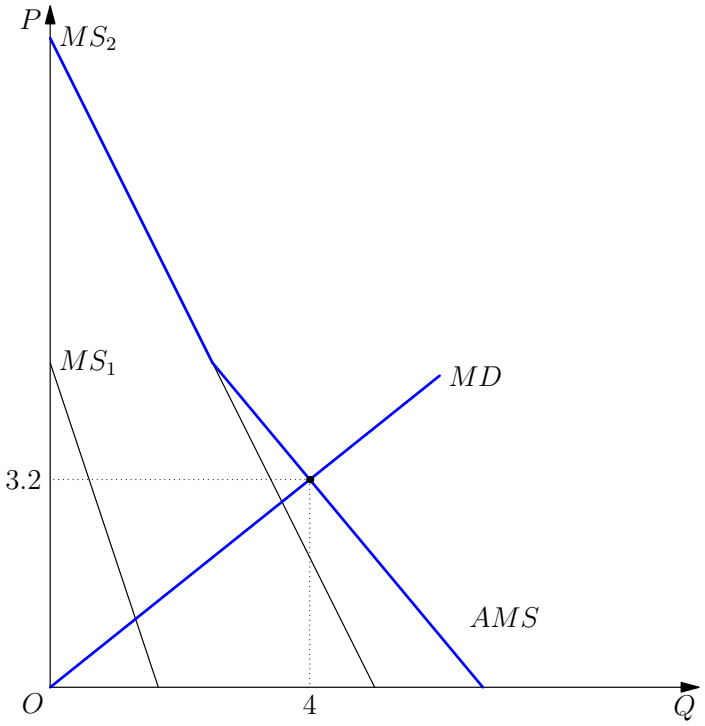

Figure 1: Pigovian Fee with Two Polluters

Solving the above equations, we have

$$\begin{cases} e_1 = 4 \\ e_2 = 1 \end{cases}$$

Therefore, the price of the permits should be $MS_1(4) = MS_2(1) = 2$.

4.

See Figure 2.

The light shaded area represents inefficiency from emission fee while the dark shaded are represents inefficiency from quantity control.

With uncertainty over marginal costs of emissions, quantity regulations are preferred if marginal damages are more steeply sloped than marginal savings from emissions; emission fees are preferred if amrginal savings are more steeply sloped than marginal damages.

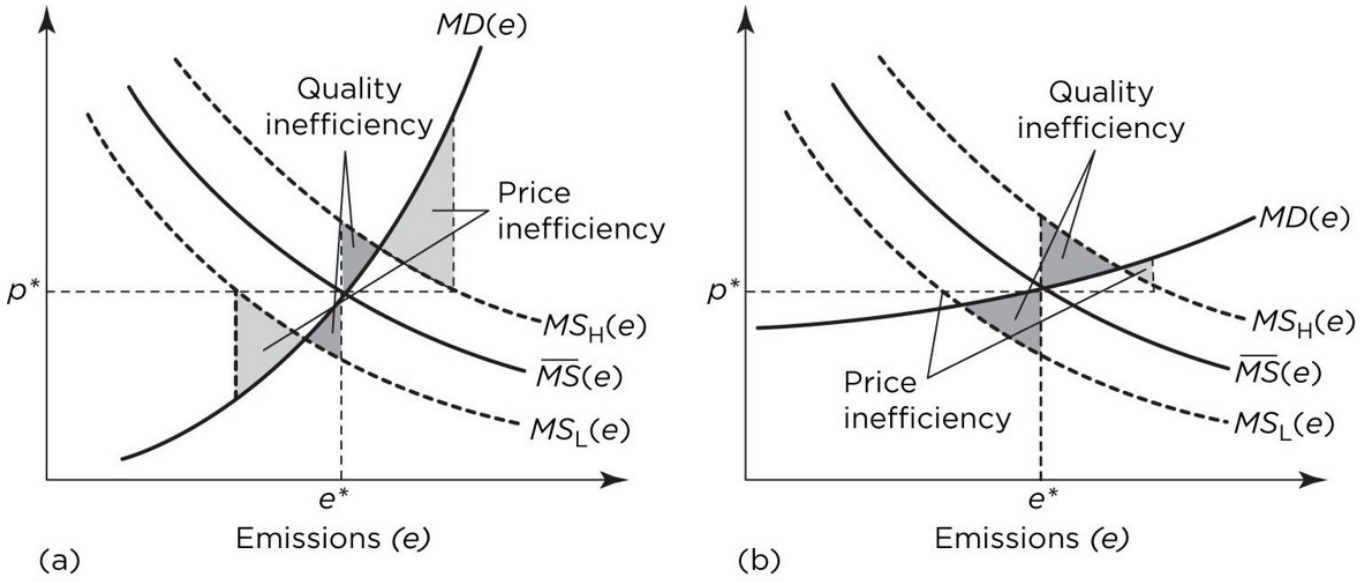

Figure 2: Welfare Losses from Price and Quantity Control