

## Precept Solutions 11/16/2005

1. Happy hours early in the evening can serve two purposes:
  - Price discrimination: Some customers (probably those who are younger and poorer or drink more) are more price-sensitive and more willing to organize their drinking time and quantity in response to prices; others have fixed schedules or are there for the ambience and are willing to pay more for a smaller quantity. Actually the marginal cost of a drink is very low compared to even happy hour prices.
  - External effect in consumption: The young crowd attracted early in the evening by the happy hour may create the ambience that attracts other customers later in the evening.
2. Hotels.com tries to price discriminate between a consumer who just browses the site casually and might buy spontaneously if she finds a good deal and doesn't care much about details, and a consumer like Martin who definitely wants to go to Florida in a particular time frame and thus should have a higher reservation price. A bit curious about this example is that the site doesn't really become aware of people who search for a very long time like Martin. Presumably these people have a low opportunity cost of time so after some searching prices should fall again. But maybe they do not want to counter the impression that demand is strong, or having prices fall again would make the scheme too obvious. Note: hotels.com did not check the IP-address, so deleting cookies worked, but one may wish to also shut down the internet connection before trying again.
3. Often airlines sell a segment at a higher price than the whole flight. For example a one-way ticket Europe-US can be much more expensive than a return flight US-Europe-US. Presumably Americans stranded in Europe without a flight home are prepared to pay a lot to get back home. So the airline tries to price discriminate. Customers could undermine this by booking a return flight and only using the second

segment, so this has to be ruled out. And return flights with origin Europe may be priced higher or sold through different distribution channels.

4. If the firms behave like perfect competitors (price-takers), the supply curves are:

$$p = MC_A = Q_A \implies Q_A = p$$

$$p = MC_B = 2Q_B \implies Q_B = \frac{p}{2}$$

Industry supply:

$$Q = Q_A + Q_B = p + \frac{p}{2} = \frac{3}{2}p$$

Then the price will be:

$$\begin{aligned} p &= 12 - \frac{1}{3}Q = 12 - \frac{1}{3} \cdot \frac{3}{2}p = 12 - \frac{1}{2}p \\ \implies p &= 8 \implies Q = 12; Q_A = 8; Q_B = 4 \end{aligned}$$

So the firms' profits are:

$$\begin{aligned} \pi_A &= R_A - C_A = 8 \cdot 8 - \frac{1}{2}8^2 = 32 \\ \pi_B &= R_B - C_B = 4 \cdot 8 - 4^2 = 16 \end{aligned}$$

We can make two observations:

-Under perfect competition the price is the same for all firms but the quantities can be different.

-Under perfect competition supplies have to be added horizontally therefore you must solve for the  $Q_A, Q_B$  in terms of  $p$  before adding.

(ii)

$$\begin{aligned} \max \pi &= R - C = p \cdot Q - C = [12 - \frac{1}{3}Q]Q - C_A - C_B \\ &= [12 - \frac{1}{3}(Q_A + Q_B)](Q_A + Q_B) - C_A - C_B \end{aligned}$$

$$\partial \pi / \partial Q_A = MR - MC_A = 0 \implies MR = MC_A$$

$$MR = 12 - \frac{2}{3}Q = Q_A = MC_A$$

Similarly for Boeing we get:

$$MR = 12 - \frac{2}{3}Q = 2Q_B = MC_B$$

So we have:

$$\begin{aligned} MC_A &= MR = MC_B \\ \implies Q_A &= 2Q_B \\ \implies 12 - \frac{2}{3}(2Q_B + Q_B) &= 2Q_B \\ \implies 12 - 2Q_B &= 2Q_B \\ \implies Q_B = 3 \quad Q_A = 6 \quad Q = 9 \\ \implies p &= 9 \\ \implies \pi &= [12 - \frac{1}{3}9]9 - \frac{1}{2}(6)^2 - \frac{1}{2}(3)^2 = 81 - 18 - 4.5 = 58.5 \end{aligned}$$

So their joint profit is now higher than the sum of their profits was under perfect competition. There are no supply curves now, since the colluding companies just pick one point on the demand curve. A supply curve gives the quantity they sell at each given price. But here they do not regard the price as given.

(iii) This would mean maximizing:

$$\begin{aligned} \max_{Q_A} [12 - (1/3)Q_A]Q_A - \frac{1}{2}Q_A^2 \\ MR &= MC \\ 12 - \frac{2}{3}Q_A &= Q_A \\ 12 &= \frac{5}{3}Q_A \\ Q_A &= 7.2 \\ \pi &= (12 - \frac{2}{3} \cdot 7.2) - \frac{1}{2}(7.2)^2 = 51.84 \end{aligned}$$

So in (ii) we had a higher total profit. How come? At this point Airbus's marginal cost is 7.2 . If we cut its output by a little and have Boeing producing that little bit, we would save on costs because Boeing's marginal cost starting at zero output is zero. And we will continue to do this until when ? Well until Boeing's marginal cost rises and Airbus's marginal costs falls to the same level, that is until we have

$MC_A = MC_B$ . This is just what we derived in (ii) as a necessary condition for optimality.

(iv) It is odd that Americans and Europeans both subsidize airplanes, which are then exported to third countries. From a US/European perspective it would be best to tax airplane exports in order to extract consumer surplus from the rest of the world. The current policy serves the interests of production workers and suppliers. Of course politicians (partially) realize this so one reason for launch aid subsidies seems to be to lower the fixed costs rather than marginal cost, which may favor (foreign) buyers less, and favor workers and shareholders more. In order to implement such a transatlantic policy a binding agreement: The subsidy game is a prisoners' dilemma.

5. Production costs cannot explain very much of that difference. Look at how cheap the cheapest hardcover books are. The publishers try to price discriminate between book lovers, people who want to read the book several times or use it daily on the one hand and casual or low-income buyers on the other hand. Also the later and uncertain release time of paperbacks allows to price-discriminate between consumers.
6. Again price discrimination, this time it even overcomes a production cost difference! As the non-economist might say, what a crazy world!
7. Harvard can discriminate on the basis of affiliation, and since it cares about the consumer surplus of its own departments and institutes, its optimal price to that group equals marginal cost. Just like transfer pricing between two vertically linked divisions of one company. (Sometimes firms do depart from using marginal cost for transfer pricing; the reasons are either different corporate taxes when the divisions are in different countries, or information asymmetries and agency problems.) Why are other visitors charged prices two or three times higher than marginal cost? Their elasticity of demand must be sufficiently low because they like the location of the hotel so close to Harvard Square when they visit Cambridge, or like or benefit from the prestige of staying in a well known Harvard-owned hotel when they come to do business in town.