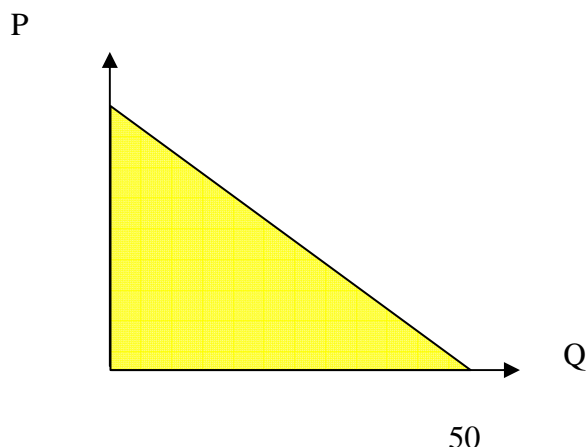


Example in Class – Aug 17, 07 – Two Part Tariff with two consumer groups

Hanover Country Club is a distinguished semi-private Golf Club in 0 Rope Ferry Road. One of the superintendent's tasks is to set an optimal pricing policy that maximizes the Club's profits. We assume that the Club knows the representative player and its demand curve from past years. Demand is given by $Q_1 = 50 - 0.25P_1$. We further assume that the Club has 100 member players and pursues its pricing strategy by taking this demand curve(s) into account. Other occasional players do not matter. There are no marginal costs. For the maintenance of the Golf Course, such as mowing, irrigation, green preparation etc. there are annual fixed costs of \$46,400. The superintendent has to choose an optimal Green Fee and an optimal Annual Membership Fee.

a) Find the optimal Green Fee and the optimal Annual Membership Fee. What is the Club's profit?

If there is only one group of consumers with known demand, the optimal pricing policy is to set the green fee equal to the marginal cost per round and to charge the entire consumer surplus as membership fee. Since there are no marginal costs, the entire area under the linear demand curve is charged as membership fee:



Profit maximizing annual membership fee involves charging the yellow triangle or

$$\frac{200 \cdot 50}{2} = \$50000. \text{ The Club's profit is revenue minus fixed costs, or}$$

$$100 \cdot 50000 - 46,400 = \$453600.$$

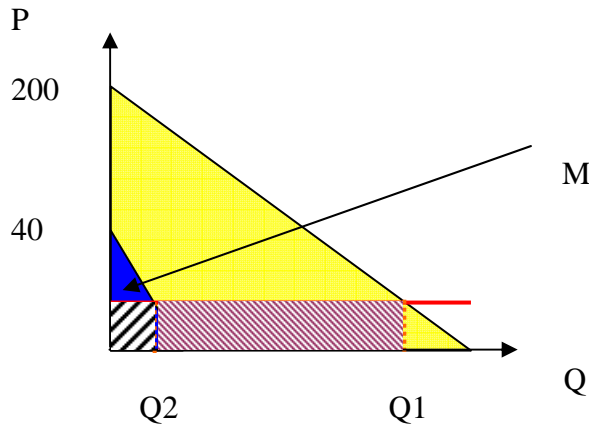
b) Now assume that a new group of players, type 2 players (students), enters the market.

Their demand curve is known to the superintendent and estimated to be $Q_2 = 20 - 0.5P_2$.

Assume that there are 200 student players per year and that the superintendent is not permitted to charge different Membership Fees. Find the optimal Green Fee and the optimal Membership Fee for this case, and the Club's profit. How many rounds (18 holes) do the type-1 players play, how many the type-2 players? Sketch the result into the chart below.

What would be the profit if the Club charges a zero green fee in this case? Compare the results and explain.

Answer: If there are two consumers, it is no longer optimal to set the green fee equal to marginal costs but to charge a markup over marginal cost such that total profits as sum of membership fees M paid by all players plus rounds played of all players times price are maximized:



$$M = \frac{1}{2}(Q2)(40 - P) = \frac{1}{2}(20 - \frac{1}{2}P)(40 - P) = (10 - \frac{1}{4}P)(40 - P) = 400 - 20P + \frac{P^2}{4}.$$

$$\max TR = \underbrace{300M}_{\text{Revenue from membership fees}} + \underbrace{P(Q1 + Q2)}_{\text{Revenue from green fees}}$$

$$\text{with } TR = 300 \cdot \left(400 - 20P + \frac{P^2}{4} \right) + \underbrace{P[100(50 - \frac{1}{4}P) + 200(20 - \frac{1}{2}P)]}_{9000P - 125P^2}$$

$$TR = 120000 - 6000P + 75P^2 + 9000P - 125P^2$$

$$TR = 120000 + 3000P - 50P^2$$

To solve mathematically for the profit-maximizing green fee, we set

$$F.O.C : MR = 0$$

$$3000 - 100P = 0 \Leftrightarrow P = \$30.$$

Thus, the optimum green fee is \$30. This leads to an optimum membership fee of

$$M = 400 - 20P + \frac{P^2}{4} = 400 - 600 + \frac{900}{4} = 25.$$

The Club charges every player a membership fee of \$25 and an optimal green fee of \$30 per round of 18 holes.

Profit analysis:

Note first that students play less than nonstudents. We find the amount of rounds played by the two types of players as follows:

$$\begin{aligned} \pi &= \underbrace{300 \cdot M}_{\text{Sum of all membership dues}} + \underbrace{100 \cdot 30 \cdot 42.5}_{\text{Greenfees paid by nonstudents}} + \underbrace{200 \cdot 30 \cdot 5}_{\text{Greenfees paid by students}} - C^F = \\ &= 7500 + 127500 + 30000 - 46,400 = 118,600 \end{aligned}$$

Note that this is lower than the profit in (a). To have students as groups of consumers without the possibility anymore to charge the nonstudents the original yellow triangle results in a lower profit.

Nevertheless, this profit is higher than charging the entire surplus of students to all players and no green fee at all: It is easy to see that this would lead only to a profit of

$$\pi = 300 \cdot CS_2 - C^F = 300 \cdot 400 - 46,400 = 73,600.$$

Summing up: If two groups of consumer are present, it is profit maximizing to charge a green fee above marginal costs and a membership fee of the residual consumer surplus of the group of consumers with the lower demand.