Problem 18

Saturday, March 6, 2021 4:38 PM

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This one requires going beyond what we talked about explicitly in class. As in the previous problem, assume there are two types of beer consumers with inverse demands of p_1=3.5-0.25q_1 and p_2=3.3-0.4q_2 and marginal cost is \$0.5 per bottle. Let α represent the fraction of type 1 consumers. Suppose the firm can only offer one bundle at one price, either because of resale limits or other practical considerations.

a) Set up the profit maximization problem. Of the four constraints from 5a, two become irrelevant. Which two and why do they become irrelevant? Of the other two, assuming both types of customers are served, which is will be binding, and why? only 1 bundle so constraints are irrelevant

$$\pi = (3.3 - .4(1-a)q)(1-a)q + (.25aq - .25(1-a)q + 3.3 - .4(1-a)q)aq - .5q$$

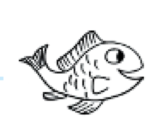
1) $3.5 - .25q_1 \geq P_1$
2) $3.3 - .4(1-a)q \geq P_2$ → binding
3) $P_1 = .24aq - .25(1-a)q + P_2$ → binding
4) $3.3 - .4q_2 - P_2 \geq 3.3 - .4q_1 - P_1$

1 and 4 become irrelevant because there is now only one price bucket. The low type customers will be binding because they will not pay more than their WTP, but the high types will always be willing to pay less.

b) Solve for the profit maximizing bundle and its price assuming both types are served. At what value of α would it make sense to price one type of customer out of the market? Which type is priced out? Why? What is the profit maximizing bundle and its price if it is most profitable to serve only one customer type? What are profits in that case, as a function of α?

$$\frac{du}{d\pi} = (10a^2 - 3a - 8)q + 28 / 10$$

Hadley said to draw alpha like a fish

 $q = 1.05$

$(1-a)q = 3.5$

$$\frac{(1-a)q}{q} = \frac{3.5}{1.05}$$

$(1-a) = 3.333$
$-2.33 = a$

It makes sense to price one type of customer out of the market once the marginal benefit of more of that kind of customer exceeds the marginal benefits lost by losing the other type. I would assume that the low type is priced out because you can't price out the high type without also pricing out the low type.

I'm confused on how to properly approach the problem because before when we've had fractions of the population, we still use the whole population. In this case, we're only using a fraction of the population.

Constraint: $P = 3.3q - .2q^2$

$\pi = \alpha(3.3q - .2q^2 - .5q) + (1-\alpha)(3.3q - .2q^2 - .5q)$ or $\pi = 3.3q - .2q^2 - .5q$

if both types served, α doesn't matter

$\frac{d\pi}{dq} = 3.3 - .4q - .5 \Rightarrow .4q = 2.8 \Rightarrow q = 7$

$P = 3.3 \cdot 7 - .2 \cdot 7^2 = 13.3$

$\pi = 13.3 - .5 \cdot 7 = 9.8$