

## Economics 380: Solutions 3

1 December, 2005

1. A firm does not deviate

$$\pi^M \leq \frac{1}{1-\delta} \frac{\pi^M}{N}$$

Now rearrange.

2. The first order conditions are given by  $MR(q_1 + q_2) = MC_1(q_1) = MC_2(q_2)$ .

3. (a) Under Bertrand,  $p = c_2$ . Profits are  $\pi_1 = c_2 - c_1$  and  $\pi_2 = 0$ .

(b) Under monopoly pricing,  $p^M = v$  and  $\pi^M = v - c_1$ .

(c) To stop firm 2 deviating we require

$$(v - c_2) \leq \frac{1}{1-\delta} t$$

To stop firm 1 deviating we require

$$(v - c_1) + \frac{\delta}{1-\delta}(c_2 - c_1) \leq \frac{1}{1-\delta}(v - c_1 - t)$$

Putting these together,

$$(1 - \delta)(v - c_2) \leq t \leq \delta(v - c_2)$$

Hence we require  $\delta \geq 1/2$ .

(d) To stop firm 1 deviating we require

$$(v - c_1) + \frac{\delta}{1-\delta}(c_2 - c_1) \leq \frac{1}{1-\delta} q_1^*(v - c_1) \tag{1}$$

To stop firm 2 deviating we require

$$(v - c_2) \leq \frac{1}{1-\delta} q_2^*(v - c_2)$$

If firm 2 is indifferent between deviating and not,  $q_2^* = 1 - \delta$ , and  $q_1^* = \delta$ . Substituting, into (1) and rearranging, cooperation requires

$$\delta \geq \frac{v - c_1}{2v - c_1 - c_2} > \frac{1}{2}$$

Intuitively, efficiency is higher in part (c), and so there is more to gain from cooperating.

4. A good answer would hit the following points.
  - (a) Explain double marginalisation.
  - (b) Explain what contractual devices can sidestep double marginalisation. For example, two-part tariffs.
  - (c) Say what's wrong with these contractual solutions. With two-part tariffs, we require a lot of information and need to stop arbitrage. Two-part tariffs are also unwieldy: can you imagine going to a two-part tariff style supermarket?
  - (d) Practically there is evidence that it's a problem. There are many real world examples, such as the Porsche case.
  
5. Observe the question you to calculate whether the firms can sustain a price *below* the monopoly price. The answer, however, is the same as before. That is we need  $\delta \leq 1/2$  to sustain cooperation.
  
6. Getting a degree in itself serves as a signal since it is harder for low ability agents to get a degree. Hence there may be low ability people who got have got in, but chose not to because they knew you would have to complete the degree.
  
7. This is a double marginalisation argument. However, there are other factors to take into account. First, the government may not maximise profits (hopefully, they try to maximise social welfare). For example, if the government just wants to have the right prices to discourage consumption, the prices would be the same under both regimes. Second, the government may be inefficient at selling alcohol, suggesting the pie is bigger in the U.K..