Industrial Organization

Normal Exam Spring 2022 – Solution Topics

I

False.

The Herfindahl-Hirschman Index is given by the sum of the squared market shares of all firms in a certain market. In a symmetric Cournot duopoly, the firms will divide the market equally: thus, $HHI = 0.5^2 + 0.5^2 = 0.5$. However, in a symmetric Bertrand duopoly, even though both firms will choose the same price (= MC) we do not know what the market share of each firm will be: perhaps A will sell 60% of the market quantity, or 30%, or 50%. Thus, the HHI in a symmetric Bertrand duopoly *may* not be 0.5.

II

False.

If firms do not discount future payoffs ($\delta = 1$) and the game is infinitely repeated, firms will have the incentive to tacitly collude. However, this does not imply that the collusion price will be *way* above firms' marginal costs. In fact, collusion can happen for any price above marginal cost. It is possible to have collusion around a price close to MC ($P = MC + \varepsilon$).

III

i) Firm S will act as a monopolist, as it believes that consumers from the South part of the town will for sure repair shoes at this store. P=6.

ii) Firm N has a different belief: it believes that consumers are active searchers, i.e., consumers will check the price charged by either shop before ordering a repair. Hence, this firm will undercut firm S's price, charging P=$6 - \varepsilon$.

iii) Yes, firms will learn about consumers' search behavior by the end of the first week, by looking at the quantities each firm sold in this week.

- If $q_S = 0$ and $q_N = 4$, then consumers are active searchers.
- If $q_S = 2$ and $q_N = 2$, then consumers are not active searchers.

All this is common knowledge.

iv) If consumers are active searchers, firms will compete à la Bertrand. Firm S will, therefore, charge P=MC=2.

If consumers are not active searchers, firm S will keep charging its monopolist price, P=6.

v) If consumers are active searchers, firms will compete à la Bertrand. Firm N will, therefore, charge P=MC=2.

If consumers are not active searchers, firm N will charge its monopolist price, P=6.

IV

i) $\frac{\pi^M}{2} + \delta\frac{\pi^M}{2} + \delta^2\frac{\pi^M}{2} + \cdots \geq \pi^M \Leftrightarrow \delta \geq \frac{1}{2}$

ii) The optimal collusive price will be the monopoly price:

$$\max_Q (10 - Q)Q - 4Q$$

$$\text{FOC: } 10 - 2Q - 4 = 0 \Leftrightarrow Q = 3 \Rightarrow P = 10 - 3 = 7$$

iii) $\frac{\pi^M}{2} + \delta p\frac{\pi^M}{2} + \delta^2 p^2\frac{\pi^M}{2} + \cdots \geq \pi^M \Leftrightarrow \frac{\pi^M}{2} + \delta p\frac{\pi^M}{2} + (\delta p)^2\frac{\pi^M}{2} + \cdots \geq \pi^M \Leftrightarrow \delta p \geq \frac{1}{2} \Leftrightarrow \delta \geq \frac{1}{2p}$

iv) The minimum discount factor δ such that collusion is preferred to deviation will be <u>higher</u> in this case than when entry was not a concern: given that $0 < p < 1, \frac{1}{2p} > \frac{1}{2}$, meaning that it will now be <u>harder</u> to sustain tacit collusion. This happens because the range of values of δ that are now consistent with collusion, $\left[\frac{1}{2p}; 1\right]$, is *smaller* than before: $\left[\frac{1}{2}; 1\right]$.

v) Given that $0 \leq \delta \leq 1, \frac{1}{2p} > 1 \Rightarrow p < 0.5$ are the values of p for which tacit collusion becomes unattainable.

vi) "Revolutionary" entry lowers firms' ability to engage in tacit collusion because, as implied in **iii)**, *the future looks worse* for the incumbent firms: all else equal, they now have less to gain from engaging in collusion. The same logic can be generalized to a case in which the incumbents and the entrant share the market following entry: payoffs under collusion will be lower (say, $\frac{\pi^M}{3}$ instead of $\frac{\pi^M}{2}$) than before, while the payoff under deviation remains the same (π^M due to price competition). Therefore, it is clear that even the entry of a "non-revolutionary" firm can make tacit collusion less appealing for each firm, and hence less likely.