Industrial Organization

Final Exam Fall 2024 – Solution Topics

1. True.

When consumers refrain from actively seeking the lowest prices, each firm effectively operates within its own set of consumers, facing its own demand curve. In this setting, firms possess the ability to maximize profits by tailoring prices according to their individual demand, essentially operating as a monopoly and charging the corresponding monopoly price. As a result, they charge a higher price than would prevail if consumers actively compared prices.

In other words, the lack of price comparison behaviour allows firms to set profit-maximizing prices, exploiting consumers' tendency not to search for better deals. This underscores how firms can leverage consumer behaviour to their advantage in setting prices that maximize their profits.

2. False.[1]

While explicit collusion facilitates coordination through direct communication between firms, tacit collusion, where firms cooperate without direct communication, can yield similar profits. For instance, both tacit and explicit agreements may result in firms charging the monopoly price, leading to identical profit outcomes.

3.

(i)

Each firm will be a monopolist in its own town. Thus:

$$\max_P \pi^M = (P-2)(6-P)$$

$$FOC\colon \frac{d\pi^M}{dP} = 0 \Leftrightarrow 6 - 2P + 2 = 0 \Leftrightarrow \boldsymbol{P^* = 4 \wedge Q^* = 2 \wedge \pi^* = (4-2)\times 2 = 4}$$

(ii)

In this case, the market would be composed by two symmetric firms that compete à la Bertrand. As a result, the equilibrium is the well-known Bertrand Paradox where $\boldsymbol{P = MC = 2 \wedge \pi = 0}$.

(iii)

Each firm will charge a price equal to the monopoly price, $P = 4$. At this price, neither firm would have an incentive to "cross the bridge" and sell pizzas in the other town. This is because the

[1] Recognizing that higher profits are more likely under explicit collusion, due to the possibility of direct communication between firms, was part of the grading criteria.

delivery charge is slightly above 4 per pizza (i.e., $4 + \varepsilon$). Even if a firm were to set the price of its pizza at zero, the total cost for consumers purchasing an out-of-town pizza would equal the delivery charge, $4 + \varepsilon$, which exceeds the price charged by the local pizza shop.
In other words, the delivery charge of $4 + \varepsilon$ prevents firms from entering the other town and undercutting their out-of-town competitor. Consequently, each firm will set $P = 4$, earning profits of $\pi = 4$, as in part (i).

(iv)

As previously noted, a delivery charge of $4 + \varepsilon$ prevents firms from entering the other town. Consequently, the out-of-town delivery fee will not generate any revenue.

(v)

The out-of-town delivery fee was introduced as a mechanism to avoid the Bertrand Paradox once the two towns became connected by the bridge.

4.

(i)

The optimal tacit collusion price corresponds to the highest acceptable bid – 4 monetary units.

(ii)

The winner will sell 10 000 units of the part at a price of 4 per unit, resulting in a total profit of 20 000.

(iii)

The expected yearly profit when they both collude around the optimal bidding price is $E[\pi] = 0.5 \times \pi^M + 0.5 \times 0 = 0.5 \times 20\,000 = 10\,000$.

(iv)

Firms will collude as long as the present value of profits under collusion is higher than the present value of profits under deviation. In this case, that happens when each firm's discount factor is higher than ½:

$$\frac{\pi^M}{2} + \delta\frac{\pi^M}{2} + \delta^2\frac{\pi^M}{2} + \cdots > \pi^M \Leftrightarrow \cdots \Leftrightarrow \delta > \frac{1}{2}$$

where $\frac{\pi^M}{2}$ is the expected profit in each period under collusion ($E[\pi] = 0.5 \times \pi^M + 0.5 \times 0$).

(v)[2]

Firms will collude as long as the present value of profits from collusion exceeds the present value of profits from deviation. In this context, the present value of profits under collusion remains unchanged. However, the present value of profits from deviation mirrors a one-period detection lag scenario. By deviating and securing a two-year contract, the auction winner effectively earns the full monopoly profits twice. Consequently, the critical value of delta will be $\sqrt{1/2}$:

$$\frac{\pi^M}{2} + \delta\frac{\pi^M}{2} + \delta^2\frac{\pi^M}{2} + \cdots > \pi^M + \delta\pi^M + 0\delta^2 + 0\delta^3 + \cdots \Leftrightarrow \frac{\pi^M}{2}\left(\frac{1}{1-\delta}\right) > \pi^M(1+\delta)$$

$$\Leftrightarrow \frac{1}{2} > (1-\delta)(1+\delta) \Leftrightarrow > \delta > \sqrt{1/2}$$

(vi)

Since the critical value of delta has increased, sustaining collusion has become harder. This occurs because the short-term gains from deviation have risen, making firms more tempted to deviate from the collusive agreement.

(vii)

From the carmaker's perspective, the optimal contract length is an infinite contract – a lifetime contract. This arrangement transforms the interaction into a one-shot game, eliminating the possibility of collusion and resulting in the well-known Bertrand Paradox equilibrium.

(viii)

Under the optimal contract length, the Bertrand Paradox equilibrium will emerge among the parts suppliers. As a result, firm C will pay 2 for each unit of the part.

[2] Please note that while the critical value of delta would remain unchanged if it were assumed that firms received profits only once every two years, this reasoning is incorrect.