ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

INDUSTRIAL ECONOMICS

PRACTICE PROBLEM SET IV: COLLUSION

1. Tacit collusion (in prices)

In an oligopolistic market, there exist initially 3 firms, firm1, 2, and 3, which choose their prices simultaneously and independently in each period t, where $t = 1, 2, 3, \ldots, T$. The firm that sets the lower price gets the whole market demand. If firms set the same price, they share the market. If a firm sets a higher price than the other firms, it has zero demand. The marginal cost of each firm is 6. The market demand for the product that they produce is $P = 20 - Q$, where Q is the total demand of the product. The discount factor of future profits is δ, with $0 \leq \delta \leq 1$. Assume that $T \to \infty$.

(i) What is the price and the profits of each firm in a period without tacit collusion and in a period with tacit collusion (when firms charge the monopoly price);

(ii) When can we have tacit collusion in equilibrium? (Find the condition that should be satisfied).

(iii) Assume that firms 1 and 2 merge among them and that their marginal cost continues to be equal to 6. Would your answer in part (ii) change? Yes or no and why?

(iv) Assume now that firms 1 and 2 merge among them and that the marginal cost of the merged firm is equal to zero. Assuming that if they have tacit collusion they charge the price that a monopolist with marginal cost 6 would charge, would it be easier or harder to have collsuion now relative to part (iii)? Yes or no and why?

2. Tacit collusion (in prices) with Asymmetric Costs

In an oligopolistic market, there exist 4 firms, firm 1, 2, 3, and 4, which choose their prices simultaneously and independently in each period t, where $t = 1, 2, 3, \ldots, T$. The firm that sets the lower price gets the whole market demand. If firms set the same price, they share the market. If a firm sets a higher price than the other firms, it has zero demand. The marginal cost of firm 1 is 4 while the marginal cost of the other firms is 5. The market demand for the product that they produce is $P = 20 - Q$, where Q is the total demand of the product. The discount factor of future profits is δ, with $0 \leq \delta \leq 1$. Assume that $T \to \infty$. Assume that in a period of tacit collusion firms set the price that a monopolist with marginal cost 4 would set.

(i) What are the profits of firm 1 in a period without tacit collusion, in a period in which firm 1 deviates from tacit collusion and in a period in which it is punished for its deviation.

(ii) When can we have tacit collusion in equilibrium? (Find the condition that should be satisfied).

3. Tacit collusion (in quantities)

Consider a market with two identical firms which compete in quantities and face the following demand function $p(Q) = 1 - Q$, where Q is the total quantity. Every firm i, with $i = 1,2$, faces a constant marginal cost c, where $0<c<1$.

(i) Find the equilibrium output and profit of each firm if they (tacitly) collude.

(ii) When can we have tacit collusion in equilibrium? (Find the condition that should be satisfied).

4. Tacit collusion (in quantities) with Asymmetric Costs

In an oligopolistic market, there exist 2 firms, firm A and firm B, which choose their quantities simultaneously and independently in each period t, where $t = 1, 2, 3, \ldots, T$. The marginal cost of firm A is 2 while the marginal cost of firm B is 4. The market demand for the product that they produce is $P = 12 - Q$, where Q is the total demand of the product. The discount factor of future profits is δ, with $0 \leq \delta \leq 1$. Assume that $T \to \infty$. Assume that in a period of tacit collusion firms set the price that a monopolist with marginal cost 2 would set.

What are the profits of *each* firm in a period without tacit collusion, in a period in which the firm deviates from tacit collusion and in a period in which it is punished for its deviation.