

**Lecture 12:** Collusion II (C&W, Ch. 10)

Today's Agenda

- Finish material from last time:
  - Infinitely repeated games:
    - \*  $\Rightarrow$  Collusion possible if the players are sufficiently patient.
- A linear duopoly example.
- Discussion of factors that make collusion easier.

**A linear example**

- Assume:

- linear demand,

$$D(q_1 + q_2) = a - b(q_1 + q_2),$$

- and linear (and identical) cost,

$$C(q_i) = cq_i.$$

- Firm 1's profit:

$$\pi_1(q_1, q_2) = [a - b(q_1 + q_2)]q_1 - cq_1$$

(and similarly for Firm 2).

- We can now derive:

- Outputs in Cournot-Nash eq.:

$$q_1^c = q_2^c = \frac{a - c}{3b}.$$

- Profits in Cournot-Nash eq.:

$$\pi_1^c = \pi_2^c = \frac{(a - c)^2}{9b}.$$

- Outputs if the firms jointly produce the monopoly output and share the market equally:

$$q_1^m = q_2^m = \frac{a - c}{4b}.$$

- Profits if the firms jointly produce the monopoly output and share the market equally:

$$\pi_1^m = \pi_2^m = \frac{(a - c)^2}{8b}.$$

- Firm 1's output and profit if making the optimal deviation from the agreement  $(q_1, q_2) = (q_1^m, q_2^m)$ :

$$q_1^r = \frac{3(a - c)}{8b}, \quad \pi_1^r = \frac{9(a - c)^2}{64b}.$$

- Note that we have:

$$\pi_1^c < \pi_1^m < \pi_1^r.$$

- Recall the formula for the critical value of the discount factor (above which collusion is possible):

$$\delta \geq \frac{\pi_1^r - \pi_1^m}{\pi_1^r - \pi_1^c}.$$

- Plugging in our expressions for  $\pi_1^c$ ,  $\pi_1^m$ , and  $\pi_1^r$  yields:

$$\begin{aligned} \delta &\geq \frac{\pi_1^r - \pi_1^m}{\pi_1^r - \pi_1^c} \\ &= \frac{\frac{9(a-c)^2}{64b} - \frac{(a-c)^2}{8b}}{\frac{9(a-c)^2}{64b} - \frac{(a-c)^2}{9b}} \\ &= \frac{\frac{9}{64} - \frac{1}{8}}{\frac{9}{64} - \frac{1}{9}} \\ &= \frac{9}{17} \approx 0.53. \end{aligned}$$

## Factors that influence sustainability of collusion

- **Public prices.**

- The logic of the trigger strategy requires previous actions to be observable.
- In that spirit, we should expect collusion to be easier if firms are able to share information about the prices and sales of individual firms.
- Case study:
  - \* In the 1990's, the Danish competition authority wanted to improve "market transparency" (to help consumers choose the most inexpensive supplier).
  - \* Started to collect and publish firm-specific prices for concrete in some regions.
  - \* Effect: Average prices increased by almost 20 % in these regions.
  - \* The competition authority gave up the policy after a few years.

- **Size of the cartel.**

- Typically: the greater the number of competitors, the greater the incentive to cheat and hence the more difficult it is to sustain collusion. [See exercise in problem set!]

- **Lumpy infrequent orders.**

- Lumpy and large orders imply that
  - \* the gains from cheating are significant
  - \* and any punishments come far off in the future.

- (More factors listed and discussed in CW.)

## Facilitating practices

- **Facilitating practices:** Practices adopted by an industry, or by individual firms within an industry, that increase the likelihood of collusion.
  - **Exchange of information** (e.g., publishing prices).
  - **Trade associations.** Can facilitate information exchange or make punishments harsher (exclusion from the trade association).
  - **Price leadership.** One firm initiates a price change and the others follow.
    - \* This can help coordination on the collusive outcome.

- **Most-favored customer clause.** Contractual commitment by a seller that all customers will pay the lowest price charged any customer.
  - \* Makes it more costly for a firm to deviate from a collusive agreement (since it has to charge the lower price to all customers).
  - \* Gives the customers a stronger incentive to watch out for (secret) price cuts, which then also the competitors can find out about.
- (More facilitating practices listed and discussed in CW.)