

# Applied Microeconomics: Firm and Household

## Lecture 16: Cartels

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# Outline

- Cartels
  - Incentives & Cartels
  - Cartel Formation
  - A Formal Example

# Forming Cartels

A group of firms that explicitly coordinates its pricing or output activities is called a **cartel**.

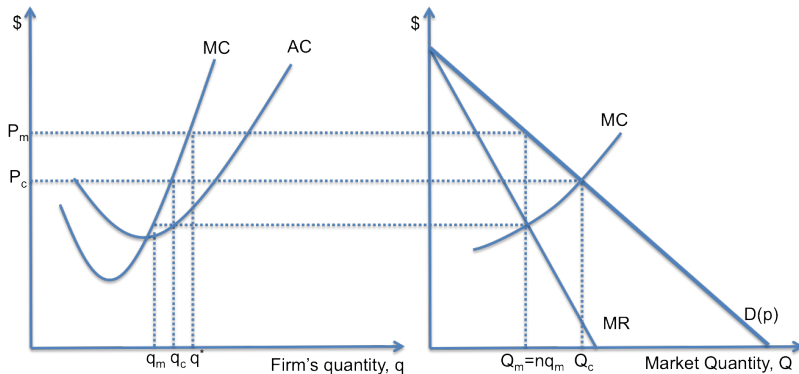
- A cartel could act like a monopoly (if all firms in the industry are involved) or as a dominant firm with a competitive fringe.
  - In either case, cartels restrict output to drive up the price.
- A successful cartel can increase each individual firm's profits, and thus collective profits.
- Members of cartels have incentives to coordinate, but each member also has an incentive to cheat. This causes cartels to fail even without government intervention.
- Cartels are illegal in most developed countries, for most industries. Firms that are caught colluding pay huge fines and sometimes managers are imprisoned.

# Firms' incentives

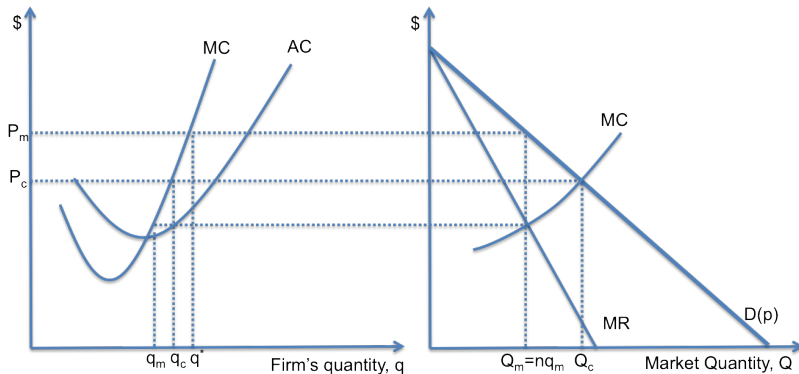
First, consider single firm's incentives with regard to forming a cartel:

- Because cartels are illegal, a firm will prefer to stay out of the cartel if a cartel is formed.
  - It can produce as much as output at the higher cartel price.
  - It avoids breaking the law.
- If the cartel cannot be formed without this firm, then the firm will join if:
  - the benefits of cartel exceed the costs – if the risk of being caught or fines are low, or if the profits are high.
- Once the cartel is formed, the firm has an incentive to cheat and produce more, because the cartel might not know who is producing the extra output.
  - each firm can produce more than the target output and sell at the higher cartel price
  - the cartel will fall apart.

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- a cartel can increase the market price and total industry profits by producing at  $Q_m$ ,  $P_m$ .
- each firm has an incentive to cheat, and produce  $q^*$ .

# Factors Facilitating Formation of Cartels

The main factors needed to form a cartel are:

- The cartel must be able to increase the price above the non-cartel price level.
  - the more inelastic the demand the higher the price a cartel can set.
  - a larger market share for the cartel improves its ability to increase the price.
  - market entry by nonmember firms limits the cartel's ability to increase the price.
  - close substitutes in other industries limits the cartel's ability to increase the price.
- Low expectations of severe punishment.
  - Penalties are set by antitrust laws.
- Low organizational costs. Factors that reduce costs are:
  - Few firms, high market concentration, nearly identical products, and the existence of a trade association.

# Factors Facilitating Success of Cartels

We noted that the following factors are important to allowing cartels to form

- small number firms
- homogeneous good
- no close substitutes
- inelastic demand curve
- no threat of entry

However, even when all these conditions are met, a cartel cannot be successful if it cannot enforce its agreement and detect cheating.



# Factors limiting the incentives to cheat

Under the following circumstances, cartel enforcement is easier because members do not have strong incentives to cheat:

- Nearly-vertical marginal cost curve (inelastic)
  - MC is nearly vertical if a firm is close to its full capacity.
  - Firms don't have strong incentives to cheat because increasing production is too costly.
- If there are too many customers placing small, frequent orders, as opposed to just a few customers placing large orders. (Why?)
- If there is a single sales agent.
  - The iodine cartel used a central office for all its sales and lasted for 61 years.

## A Formal Example

An industry consists of eleven identical firms with costs  $c(q) = 4q + q^2$ . Market demand is  $Q = 100 - p$ .

**A.** What are the equilibrium price, output and profits of each firm if all eleven participate in a cartel?

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**A.** What are the equilibrium price, output and profits of each firm if all eleven participate in a cartel?

First, we need to find the cartel's cost function. Note that because the firms are identical, the cartel's costs is  $11c(q)$ . Also, because  $q = \frac{Q}{11}$ , we can find the cartel's cost function as

- $$c(Q) = 11 \left( 4 \left( \frac{Q}{11} \right) + \left( \frac{Q}{11} \right)^2 \right)$$

- $$c(Q) = 4Q + \frac{Q^2}{11}$$

The marginal cost function is  $MC(Q) = 4 + 2Q/11$ .

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The marginal cost function is  $MC(Q) = 4 + 2Q/11$ . Next, we obtain marginal revenue:

- $P(Q) = 100 - Q \rightarrow MR(Q) = 100 - 2Q$

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- $4 + 2Q/11 = 100 - 2Q$
- $24Q/11 = 96$
- $Q^* = (96/24)(11) = 44$

Thus, each firm produces  $q^* = 44/11 = 4$ . And the market price is:

- $P^* = 100 - 44 = 56$

Profits are:

- $pq - c(q) = 56 * 4 - 4 * 4 - 4^2 = 48 * 4 = \$192$

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by setting  $MC(q)$  equal to cartel price,  $P^* = 56$ , we find the cheating firm's output:

- $4 + 2q = 56 \rightarrow q = 26$

Its profits are:

- $\pi = (26)(56) - 4(26) - (26)^2$

- $\pi = (26)(26) = 676.$

Exercise: Identify the false assumption we made here, and solve for the correct profits for the firm. When is the assumption acceptable?