

Microeconomics, Module 15: "Oligopolies" (Chapter 11)

*Homework Assignment*

(The attached PDF file has better formatting.)

Cournot Oligopoly and Number of Firms

In a Cournot oligopoly, each firm assumes that its rivals do not change their output based on the output that it produces.

Illustration: A Cournot oligopoly has two firms, Y and Z. Y observes the market demand curve and the number of units that Z produces. It assumes that Z does not change its output regardless of the number of units that it (Y) produces, so chooses a production level that maximizes its profits.

The general effects of a Cournot oligopoly do not depend on the size of the firms, the shape of the market demand curve, or the shape of the marginal cost curve. The mathematics is easiest for firms of the same size, linear demand curves, and flat marginal cost curves.

Suppose an industry has two firms, a linear demand curve, and marginal costs, and no fixed costs:

- Demand curve:  $Q = \alpha - \beta P$
- Marginal cost curve:  $MC = k$

In a competitive industry, what is the equilibrium quantity for the industry? (Setting price equal to marginal cost gives  $Q = \alpha - \beta \times k$ . Since the industry is competitive, price equals marginal cost, and the supply curve for the industry is  $P = k$ ; this gives the same result.)

What is the equilibrium quantity for the firm? (With two identical firms, each produces half the industry quantity.)

If the two firms merge into a monopoly, what is the monopoly price? (Show that the marginal revenue curve is  $MR = \alpha - 2\beta P$ , by setting total revenue =  $P \times Q$  and differentiating with respect to  $Q$ . Setting marginal revenue equal to marginal cost gives

$$k = \alpha - 2\beta P \Rightarrow P = (\alpha - k) / 2\beta$$

$$Q = \alpha - \beta P = \alpha - \frac{1}{2}(\alpha - k) = \frac{1}{2}\alpha + \frac{1}{2}k$$

A total of 2,400 units are produced. If there were three firms in this Cournot oligopoly, how many units would be produced?

- A. 1,800 units
- B. 2,400 units
- C. 2,700 units
- D. 3,000 units
- E. 3,600 units

(In a two Cournot oligopoly, each firm produces  $\frac{1}{3}$  the competitive quantity; in a three firm Cournot oligopoly, each firm produces  $\frac{1}{4}$  the competitive quantity.)