

# Econ 101A

## Section 18

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### 1 From Perfect to Imperfect Competition

Table 1: Comparison between Perfect Competition and Monopoly

Type	Perfect	Monopoly
Intensive Margin Firm Decision	MC=MR	MC=MR
Marginal Revenue	$p$	$p'(y)y + p(y)$
Aggregate Supply	$Y^S = Jy$	$Y^S = y$
Aggregate Demand	$X^D = D(p)$	$X^D = D(p)$
Entry if...	$p > AC(y)$	none

### 2 Monopoly Profit Maximization and Elasticities

The monopoly wants to solve

$$\max_y p(y)y - c(y)$$

which yields a first order condition

$$0 = p'(y)y + p(y) - c'(y)$$

We can divide both sides of the above equation by  $p(y)$  to get

$$0 = \underbrace{\frac{dp}{dy} \frac{y}{p(y)}}_{1/\varepsilon_{y,p}} + 1 - \frac{c'(y)}{p(y)}$$

Keep in mind that  $\varepsilon_{y,p}$  is generally negative (because demand is downward sloping). Rearranging the previous expression gives:

$$\frac{p - c'(y)}{p} = -\frac{1}{\varepsilon_{y,p}}$$

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The term on the left is the markup (sometimes denoted  $\mu$ ). Remember in perfect competition, firms price at marginal cost (so  $\mu = 0$ ). When firms have market power, they mark prices up above marginal cost by a certain percentage that's related to the demand elasticity. Notice that the mark-up is inversely related to price elasticity of demand

### 3 Price Discrimination

- **1st Degree:** One price per consumer. All surplus goes to the firm.
- **2nd Degree:** Price schedules:  $P(q_i)$ , where  $q_i$  is  $i$ 's quantity purchased. So price depends on quantity purchased.
- **3rd Degree:** This happens when the market is separated in some way (geographically, demographically), and firms can charge different sectors different prices. You can think of third degree price discrimination as a coarsened version of first degree price discrimination, where in first degree price discrimination each consumer is treated as a sector.

### 4 Exercises

#### 4.1 Monopoly with Fixed Cost (Problem 1, MT2, Spring 2014)

Consider the case of a monopolist producing quantity  $Q$  with total cost  $C(Q) = F + cQ$ , with  $c > 0$  and  $F \geq 0$ .

1. Comment briefly on the cost function. Does it involve a fixed cost?
2. Determine the marginal cost function  $C'_q$  and the average cost function  $C(Q)/Q$ , and plot the two functions in a graph with x-axis quantity  $Q$  and y-axis cost/price.
3. Assume now that aggregate demand is given by the linear (inverse) demand function  $p(Q) = A - bQ$ , with  $A > c$ . Draw it in the graph with the marginal cost function of point (2). If you want, assume  $A = 10$ ,  $c = 5$ ,  $b = 1$ ,  $F = 1$  (just for the graph) Also, derive the marginal revenue  $MR$  function, by differentiating with respect to  $Q$  the revenue  $R$ , and draw the  $MR = R'$  function in the graph.
4. Find graphically the solution for monopoly quantity and price
5. Now solve analytically for the monopoly solution, by maximizing

$$\max_Q Q \cdot p(Q) - C(Q) = Q(A - bQ) - F - cQ.$$

Obtain the first order conditions and solve for  $Q^*$  and  $p^*$ , the monopoly solution.

6. Compute now the profits analytically, plugging in  $Q^*$  and  $p^*$  in the solution above.
7. A consultant to the government claims, regarding this monopoly: 'A big problem with monopoly in this industry is that profits are unfairly high.' Is that always true? Can you give conditions under which monopoly profits in this case would be *zero*?

## 4.2 Price Discrimination Exercise

Suppose that a monopoly producer of widgets has a constant marginal cost of  $MC = 6$  and sells its products in two separated markets whose inverse demand functions are  $P_1 = 24 - Q_1$  and  $P_2 = 12 - 0.5Q_2$ . Notice that consumers in market 1 are more eager to buy than are consumers in market 2 in the sense that the former are willing to pay more for any given quantity.

1. Calculate the monopolist's profit-maximizing price-quantity combinations in those two markets. What are the total profits earned by the monopolist from these two markets? Compute the deadweight losses in the two markets.
2. Let's consider now a single-price policy. Calculate the profit maximizing price. How does this pricing policy affect welfare? Compute the total deadweight losses in the two markets. Are both markets served under such a pricing strategy?