14.01 Principles of Microeconomics, Fall 2007
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Lecture 22

Monopoly

Outline

1. Chap 10: *Monopoly*
2. Chap 10: *Shift in Demand and Effect of Tax*

1 Monopoly

The monopolist is the single supply-side of the market and has complete control over the amount offered for sale; the monopolist controls price but must operate along consumer demand.

1.1 Revenue in Monopoly

Review the revenue in perfect competition:

$$R = PQ \tag{1.1}$$
$$AR = MR = P. \tag{1.2}$$

Revenue of monopolist is also

$$R = P(Q)Q,$$

but P changes with Q because the monopolist faces the whole market demand and his quantity supplied affects the market price. Then the average revenue is

$$AR = \frac{R}{Q} = P(Q);$$

and the marginal revenue is

$$MR = \frac{dR}{dQ} = \frac{d(PQ)}{dQ} = P(Q) + Q\frac{dP}{dQ}.$$

The relation between P and Q is determined by the demand curve (see Figure 1). Since

$$\frac{dP}{dQ} < 0,$$
$$MR < P(Q).$$

Example (A Demand Function). Suppose the price is

$$P = 10 - Q_D,$$

where Q_D is the quantity demanded. Calculate the average revenue and the marginal revenue:

$$AR = P = 10 - Q;$$
$$MR = p + Q\frac{dP}{dQ} = 10 - 2Q.$$

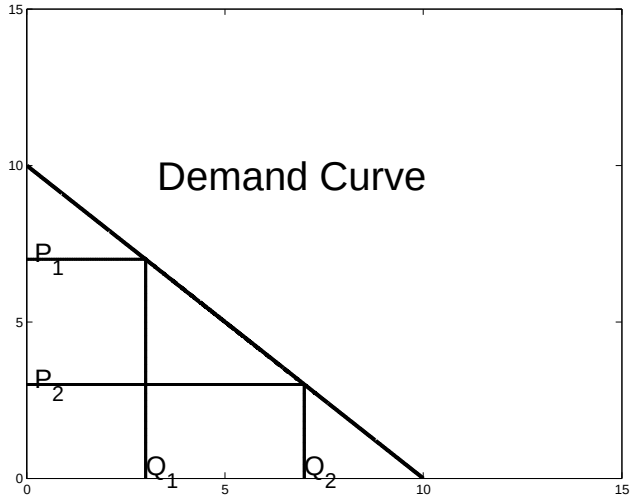

Figure 1: Demand and Supply of Monopolist.

1.2 Output Decision in Monopoly

The monopolist will maximize its profit

$$\pi(Q) = R(Q) - C(Q),$$

which is the difference of revenue and cost. When maximized,

$$\frac{d\pi}{dQ} = \frac{dR}{dQ} - \frac{dC}{dQ} = 0,$$

namely,

$$MR = MC,$$

so the monopolist would choose this point to produce; because

$$P > MR,$$

$$P > MC.$$

The profit equals to

$$(AR - AC)Q = (P - AC)Q$$

(see Figure 2).

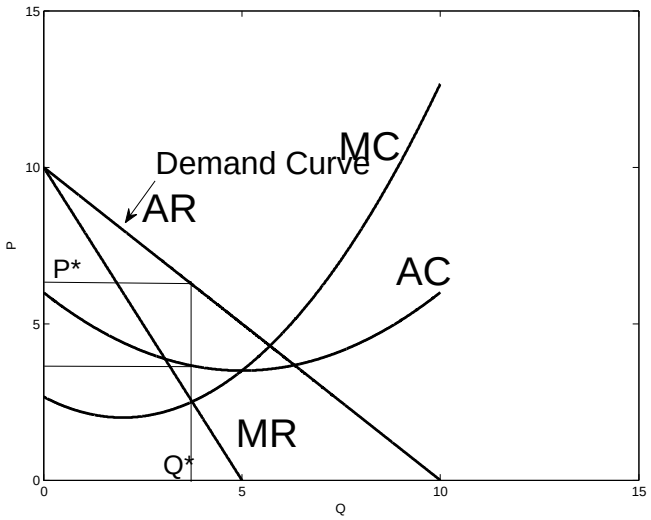

Figure 2: Output Decision of Monopolist.

1.3 Lerner's Index

Rewrite the marginal revenue:

$$MR = P + Q\frac{dP}{dQ} = P + P(\frac{Q}{P}\frac{dP}{dQ}) = P + P\frac{1}{E_D}.$$

The monopolist chooses to produce the quantity where

$$MC = MR = P + P\frac{1}{E_D}.$$

Thus,

$$\frac{1}{|E_D|} = \frac{P - MC}{P}, \tag{1.3}$$

which is the makeup over MC as a percentage of price; this fraction is less than 1. $L = \frac{P-MC}{P}$ measures the monopoly power of a firm and is called Lerner's index.

- In a competitive market,
$$MC = P,$$
and the makeup is zero.
- In a monopolistic market,
$$MC < P,$$
and the makeup is larger than zero.

Comments:

1. The makeup increases with the inverse of demand elasticity.
2. The larger the demand elasticity, the less profitable it is to be a monopolist (see Figure 3 and 4).
3. A monopolist never produces a quantity at the inelastic portion of demand curve, since the makeup right hand side of Equation 1.3 is less than one.

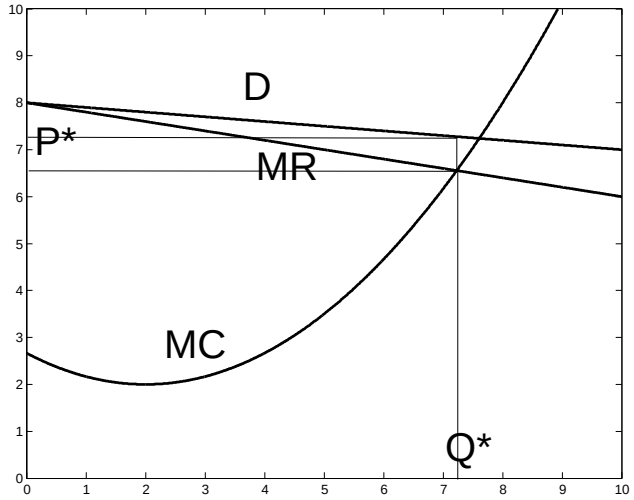

Figure 3: Inelastic Demand.

2 Shift in Demand and Effect of Tax

Compare the competitive market and the monopolistic markets.

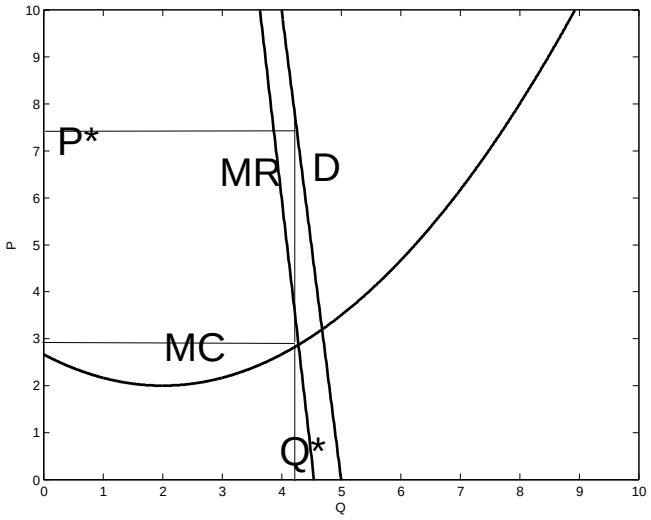

Figure 4: Elastic Demand.

2.1 Supply Curve of Competitive Market and Monopolistic Markets

The supply curve in competitive markets is determined by MC, and there is no supply curve for monopolistic markets.

2.2 Shift in Demand

In competitive markets, when demand shifts, the changes in price and quantity has a positive relation, namely, if the price raises, the quantity increases. In monopolistic markets, when the demand shifts, it may be the case that only price changes (see Figure 5), only quantity changes (see Figure 6), or both change.

2.3 Effect of Tax

In competitive marketes, buyer's prices raise less than the tax, and the burden is shared by Producers and Consumers; in monopolistic markets, the price might raise more than tax (see Figure 7).

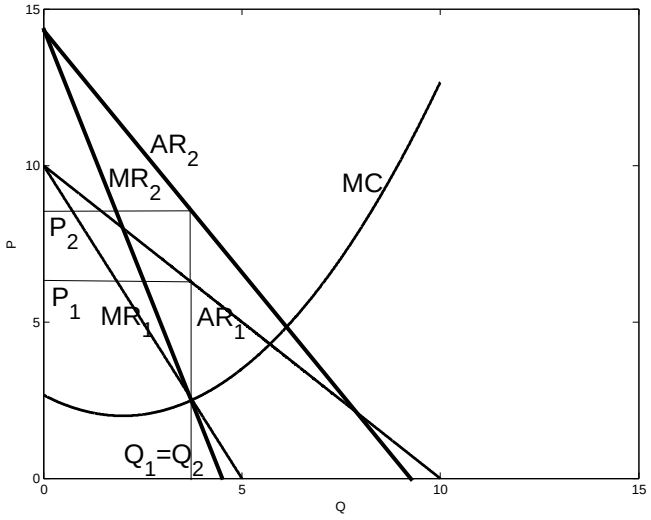

Figure 5: Only Price Change in Monopoly.

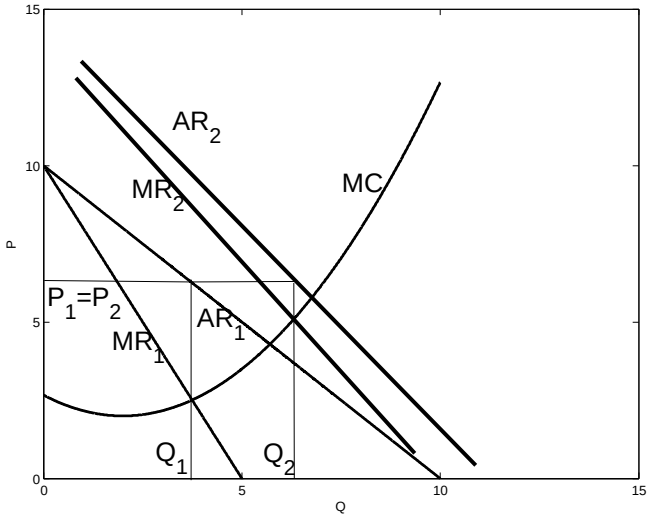

Figure 6: Only Quantity Change in Monopoly.

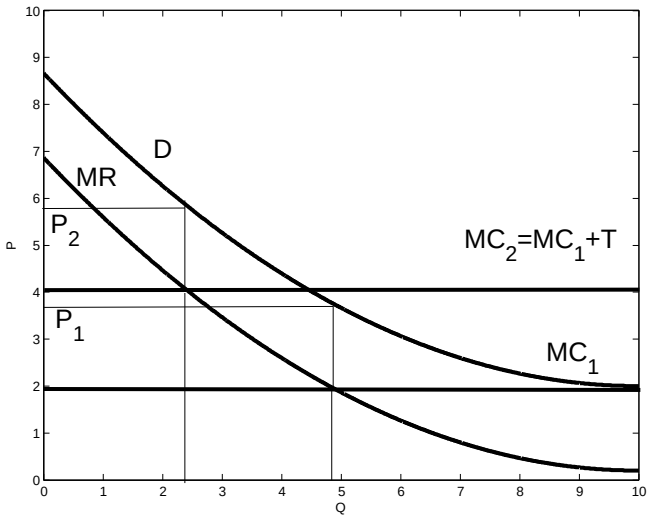

Figure 7: Price Might Raise More than Tax.