Monopoly (Ch25)

Shan Gui

Shanghai University of Finance and Economics

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What We Have Learned

Cost Minimization for Any Producer

- Find the optimal input bundle that minimizes total cost, given input prices w_1, w_2, and a target output level y.

  $\Rightarrow$ Cost function: $c(y) = w_1 x_1^* + w_2 x_2^*$.

Profit Maximization for a **Competitive Producer**

- Find the optimal output level that maximizes profit, given the output price p.

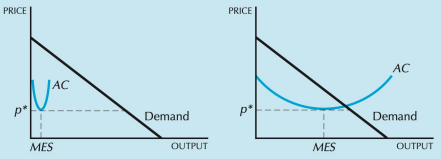
  $\Rightarrow$ Inverse supply function: $p = MC(y)$.

Profit Maximization for an (ordinary) **Monopolist** ?

- Ordinary monopolist: sets one price for all units of output.
- Find the optimal output level that maximizes profit, given the inverse market demand $p(y)$.

What Determines the Market Size in the Long Run?

Demand relative to Minimum Efficient Scale (MES)

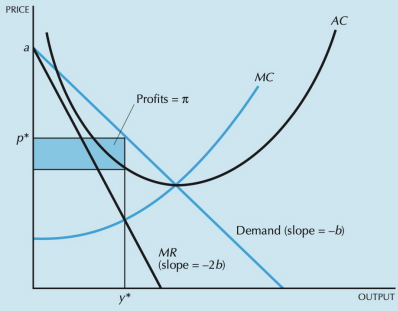


Demand relative to minimum efficient scale. (A) If demand is large relative to the minimum efficient scale, a competitive market is likely to result. (B) If it is small, a monopolistic industry structure is possible.

- The minimum value of average cost: $p^* = \min AC$
- **Minimum Efficient Scale (MES)**: the individual supply at $\min AC$
- Suppose firms have the same technology; then, the number of firms is $n = \left\lfloor \frac{D(p^*)}{MES} \right\rfloor$ (rounding down).
- Monopoly if $n = 1$.

Profit Maximization for a Monopolist

Monopolist is a Price Maker.

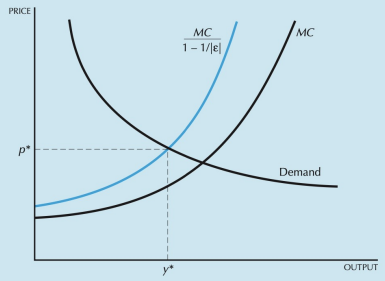


Monopoly with a linear demand curve. The monopolist's profit-maximizing output occurs where marginal revenue equals marginal cost.

- Given the market demand: $D(p)$
- Write p as a function of quantity demanded: $p(y)$
- The monopolist: $\max_y \pi(y) = r(y) - c(y) = p(y)y - c(y)$
- The **optimality condition:** $MR(y^*) = MC(y^*)$
- The monopoly price: $p^* = p(y^*) > MC(y^*)$

Profit Maximization for a Monopolist

Markup Pricing over MC



Monopoly with constant elasticity demand. To locate the profit-maximizing output level we find the output level where the curve $MC/(1-1/|\epsilon|)$ crosses the demand curve.

- Monopoly price: $p^* = p(y^*) > MC(y^*)$
- $\frac{\Delta r(y)}{\Delta y} = \frac{p\Delta y + y\Delta p}{\Delta y} = p + p\frac{\Delta p/p}{\Delta y/y}$
- $MR(y^*) = \frac{\Delta r}{\Delta y}|_{y^*} = p^*[1 - \frac{1}{|\epsilon(y)|}] = MC(y^*)$

$\Rightarrow$ $p^* = \frac{1}{1-1/|\epsilon(y^*)|} MC(y^*)$

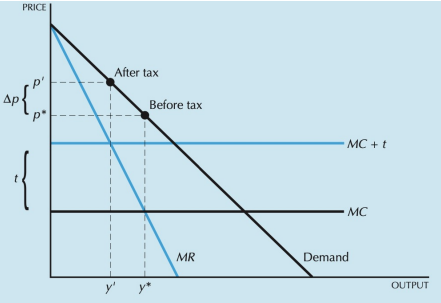
- The **markup**: $\frac{1}{1-1/|\epsilon(y)|} > 1. \Leftarrow |\epsilon(y)| > 1.$

$\Rightarrow$ A monopolist never operates where the demand curve is inelastic ($0 < |\epsilon(y)| < 1$).

- For a constant-elasticity demand ($\epsilon(y) = -c$), the markup is constant.
- For an infinitely elastic demand ($\epsilon(y) = -\infty$), $p = MC$ (Competitive firm)

The Impact of Taxes on a Monopolist

Example: Constant $MC = c$



Linear demand and taxation. Imposition of a tax on a monopolist facing a linear demand. Note that the price will rise by half the amount of the tax.

- Markup pricing: $p^* = \frac{1}{1-1/|\epsilon(y^*)|}(c+t)$
- Suppose a constant-elasticity demand.

$\Rightarrow$ Since $|\epsilon| > 1$, $\frac{\Delta p^*}{\Delta t} > 1$, the monopolist passes on more than the amount of the tax.

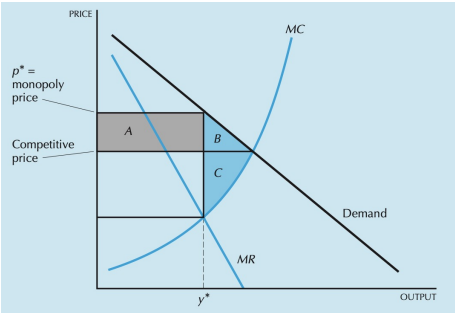
- Suppose Linear market demand: $p(y) = a - by$

$\Rightarrow$ $y^* = \frac{a-c-t}{2b}$, $p^* = a - by^*$

$\Rightarrow$ $\frac{\Delta p^*}{\Delta t} = -b\frac{\Delta y^*}{\Delta t} = -b * \frac{-1}{2b} = \frac{1}{2}$, the monopolist passes on half of the tax.

Deadweight Loss of Monopoly

Inefficiency of monopoly



Deadweight loss of monopoly. The deadweight loss due to the monopoly is given by the area $B + C$.

- A monopolist produces less than the competitive amount of output and is therefore Pareto inefficient.
- From competitive equilibrium to monopoly:

$\Rightarrow \Delta CS = -(A + B)$

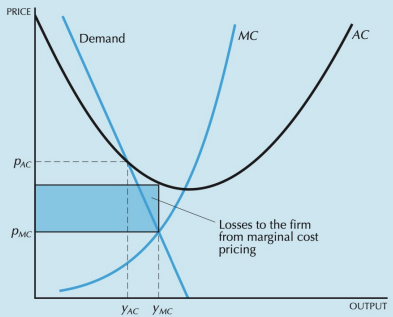
$\Rightarrow \Delta PS = A - C$

$\Rightarrow \Delta TS = \Delta CS + \Delta PS = -B - C$

$\Rightarrow$ Deadweight loss $= \max TS - TS^{Monopoly} = -\Delta TS = B + C$

Regulating Natural Monopoly

Minimum Efficient Scale (MES) is Large Relative to Demand



A natural monopoly. If a natural monopolist operates where price equals marginal cost, then it will produce an efficient level of output, y_{MC}, but it will be unable to cover its costs. If it is required to produce an output where price equals average cost, y_{AC}, then it will cover its costs, but will produce too little output relative to the efficient amount.

- A **natural monopoly** occurs when a firm cannot operate at an efficient level of output ($p = MC$) without losing money.
- If it is required to produce an output where $p = AC$, it will be inefficient.
- Many public utilities are natural monopolies of this sort and are therefore regulated by the government.

Monopoly Behavior (Ch26, Optional)

- Ordinary monopolist: sets one price for all units of output.
- Discriminating monopolist: sells different units of output at different prices.

First-degree price discrimination (Perfect price discrimination)

- Discriminating both quantity and buyers. $\Rightarrow CS = 0, PS = \max TS$
- E.g., a small-town doctor who charges his patients different prices.

Second-degree price discrimination (Non-linear pricing)

- Discriminating quantity, not buyers. (Buyers are self-selected)
- E.g., Cheaper in bundles; Discount for membership.

Third-degree price discrimination (Most common)

- Discriminating buyers, not quantity. $\epsilon^D \downarrow \Rightarrow p \uparrow$.
- E.g., Cheaper Steam games in China than in the US; Student discounts.

Monopoly Behavior (Ch. 26, Optional)

- Ordinary monopolist: One price for all units.
- Discriminating monopolist: Different prices across units/buyers.

1st-Degree Price Discrimination (Perfect)

- By quantity & buyer $\Rightarrow$ CS $= 0$, PS $=$ max TS
- E.g., small-town doctor charging each patient differently

2nd-Degree Price Discrimination (Nonlinear)

- By quantity, not buyer (self-selection)
- E.g., bulk discounts, membership deals

3rd-Degree Price Discrimination (Common)

- By buyer, not quantity: $\varepsilon^D \downarrow \Rightarrow p \uparrow$
- E.g., student discounts, regional pricing (cheaper Steam games in China)


Thank You!