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Lecture 9

Mon. Competition & Oligopoly – part I

micro2 first module

Modeling real markets

- There are ***no perfectly competitive*** markets out there
- There are ***no pure monopolies***, either
- Then, ***why*** do we consider such models?

Monopolistic Competition

Assumptions

1. Many firms
2. Differentiated product
3. Free entry and exit

1. Number of firms

- Many firms
  but ***how many*** are "many"?
- Enough, so that the firms ***do not interact***
  firms will not act ***strategically***
- However, usually we assume a ***smaller number*** of firms than in PC

2. Differentiation

- The heterogeneity of product provides ***some market power*** to the firm
- The amount of market power depends on the ***degree of differentiation***
  however, products are still highly ***substitutable***
- ***Examples*** of this very common market structure:
  toothpaste, soap, detergent, electric devices

3. Free entry and exit

- Free entry and exit will affect the ***L-R equilibrium***
- If there are ***S-R profits***
  - New firms will enter the industry
  - Supplied quantity will increase
  - Prices will drop
  - Profits will vanish
- If there are ***S-R losses***
  - Exit of firms will occur until losses vanish

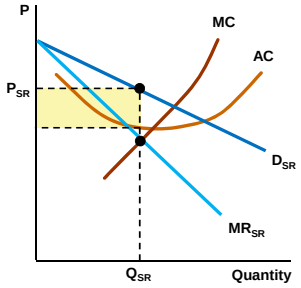
Short-run

The firm's demand:

1. ***Downward*** sloping
   because of ***differentiation***
2. ***Relatively elastic***
   there is still ***substitution***

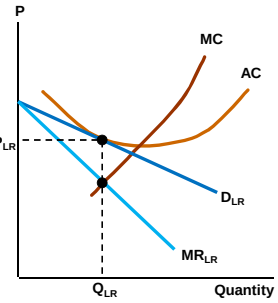
For the firm:

- $MR < p$
- Profits are maximized when ***MR = MC***
- Profit can be ***positive***



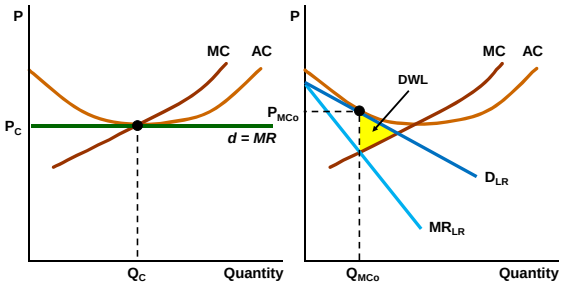
Long-run

- Profits attract ***new firms***
  no ***barriers*** to entry
- Firm's demand ***slides down***
  because new firms ***absorb*** some market demand
- Firm's ***output*** and ***price*** fall
  but total industry output ***rises***
- Price will keep dropping till it ***reaches AC,*** while $p > MC$
  firm still has ***market power***



MCo vs. PC equilibrium (L-R)

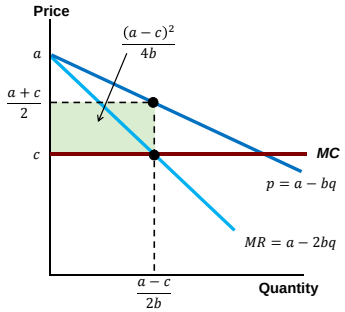
Perfect Competition | **Monopolistic Competition**



Monopoly revisited – model

- Consider the linear demand
  $$p = a - b \cdot q$$
- Constant marginal cost, c
- Profit is
  $$\Pi = (a - bq)q - c \cdot q = (a - c)q - bq^2$$
- Maximization of Π implies
  $$a - c - 2bq = 0$$
- Thus,
  $$q^* = \frac{a-c}{2b}, \quad p^* = \frac{a+c}{2}, \quad \Pi^* = \frac{(a-c)^2}{4b}$$

Monopoly revisited – graph

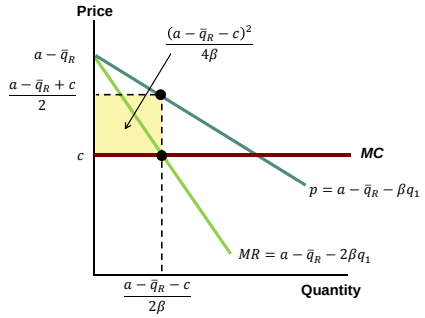


Monopolistic competition model

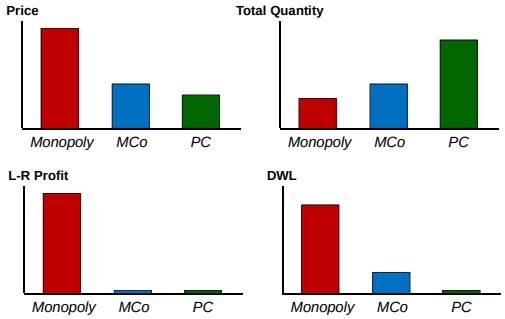
- Consider the linear ***demand*** for firm 1
  $$p = a - \bar{q}_R - \beta q_1$$
- Constant ***marginal cost***, c
- ***Profit*** for firm 1
  $\Pi_1 =$
- ***Maximization*** of Π_1 implies
  $$a - \bar{q}_R - c - 2\beta q_1 = 0$$
- Thus,
  $${q_1}^* = \frac{a - \bar{q}_R - c}{2\beta}, \quad p_1^* = \frac{a - \bar{q}_R + c}{2}, \quad \Pi_1^* = \frac{(a - \bar{q}_R - c)^2}{4\beta}$$

For firm 1, demand not the same as in monopoly:
1. The intercept is now lower
2. The slope is smaller ($\beta < b$)

Monopolistic competition – graph

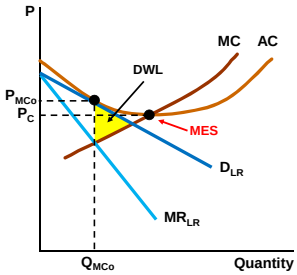


Monopoly vs. MCo vs. PC



Economic efficiency of MCo

- Market power yields a ***higher price*** than PC
  - if price was lowered PC, DWL would be eliminated
- With zero L-R profits the firm is still ***not*** producing at ***minimum AC***
  - ***MES*** is to the ***right*** of zero profit equilibrium
- ***Excess capacity*** exists
- This is ***inefficient*** because AC would be lower with ***fewer*** firms



Regulation in MCo

- This ***inefficiency*** is bad for consumers
- Then, should monopolistic competition be ***regulated***?
  - Market power is ***relatively small***
  - Deadweight loss is ***small***
  - Competition is usually ***satisfactory***
- Inefficiency is balanced by benefit of ***increased product diversity***
  - diversity may easily ***outweigh*** deadweight loss

Advertising

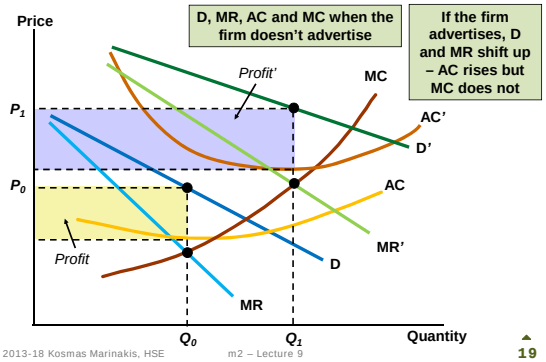
- Firms with market power have to ***decide how much*** to advertise
- We will explore how firms choose ***profit maximizing*** advertising
  - decision ***depends*** on characteristics of demand for firm's product

Model assumptions

1. Firm sells ***only one*** price for product
2. Firm ***knows*** the demand $Q(p, \Delta)$
   quantity is a ***function*** of price, p, and advertising expenditure, Δ

- We can show the firm's cost ***curves***, revenue curves, and profits under advertising and under no advertising

Effects of advertising



Model

- The ***profit*** under advertising is

$$\Pi = p \cdot Q(p, \Delta) - C\big(Q(p, \Delta)\big) - \Delta$$

- ***Maximize*** with respect to Δ

$$\frac{\partial \Pi}{\partial \Delta} = p \cdot \frac{\partial Q}{\partial \Delta} - \frac{\partial C}{\partial Q}\frac{\partial Q}{\partial \Delta} - 1 = 0 \Rightarrow$$

$$\Rightarrow (p - \mathrm{MC})\frac{\partial Q}{\partial \Delta} = 1$$

- We can ***manipulate*** this equation as

$$p\frac{p - \mathrm{MC}}{p}\frac{\partial Q}{\partial \Delta} = 1 \quad \Rightarrow \quad p\frac{1}{|\varepsilon_d|}\frac{\partial Q}{\partial \Delta} = 1$$

Optimal Δ

$$p\frac{1}{|\varepsilon_d|}\frac{\partial Q}{\partial \Delta} = 1$$

- Multiply both sides by Δ/Q

$$p\frac{1}{|\varepsilon_d|}\frac{\Delta}{Q}\frac{\partial Q}{\partial \Delta} = \frac{\Delta}{Q}$$

- Finally,

$$\frac{\Delta}{R} = \frac{\delta}{|\varepsilon_d|}$$

Advertisement as a fraction of total revenue

Ratio of elasticity of advertisement to the elasticity of demand

*Empirical estimates of elasticities

- Supermarkets

$$\varepsilon_d \approx -10, \qquad \delta \approx 0.1 \; to \; 0.3$$

- Convenience stores

$$\varepsilon_d \approx -5, \qquad \delta \approx 0$$

- Designer jeans

$$\varepsilon_d \approx -3.5, \qquad \delta \approx 0.3 \; to \; 1$$

- Detergents

$$\varepsilon_d \approx -3.5 \; to \; -4; \quad \delta \; very \; large$$

Oligopoly

Assumptions:

1. ***Small number*** of firms
2. ***Product differentiation*** may (or may not) exist
3. ***Barriers*** to entry

1. Number of firms

- The number of firms is small so that ***interaction*** between firms is possible and meaningful
  - every firm must ***take into account*** other firms' actions
- ***Interaction*** means that actions of others ***affect me*** and my actions ***affect others***
  - You cannot think of actions ***independently***, anymore
  - You must consider how rivals ***may answer*** your actions
- ***All firms assume*** competitors are taking rival decisions into account

2. Product differentiation

- Product differentiation does ***have an impact*** in oligopoly models
  - but it is ***not crucial***
- This is because firms are not too many and thus ***market power*** can exist ***without*** product differentiation
- Under oligopoly firms ***are supposed to have*** market power
  - however, it is ***not certain*** if they will be able to ***use it*** in the end

3. Barriers

- Oligopoly firms want to ***protect their turf*** by creating barriers to entry
- Strategic actions to deter entry:
  - ***Threaten*** to engage in price cuts
  - Invest in ***differentiation*** (R&D or advertisement)
  - Build ***excess capacity***
- In most of the following models of oligopoly we will ***not have a distinction*** of S-R and L-R periods

Examples of oligopolistic markets

- Middle-high class cars
  - BMW, Mercedes, Audi, Volvo
- High-end smartphones
  - iPhone, Galaxy, Pixel
- Web based email
  - Hotmail, Gmail, Yahoo
- Medication for ED
  - Viagra, Cialis, Levitra

Competition with respect to what?

- Firms have to choose in ***which field*** they will compete
  - Apple and Samsung are competing with respect to ***technological advancement***
  - BMW and Benz are competing with respect to ***quality***
  - Coke and Pepsi are competing with respect to ***advertisement***
  - DKNY and Calvin Klein compete with respect to ***design***
  - Mozilla and Chrome compete with respect to ***market share***
  - HSE and NES compete with respect to ***research***
  - Oil producing nations are competing with respect to ***quantities***
  - Supermarkets compete with respect to ***price***

Map of models

- ***Cournot:*** Static competition with respect to quantities
  - the choice variable of the firm is the ***quantity***
- ***Bertrand:*** Static competition with respect to prices
  - the choice variable of the firm is the ***price***
- ***Stackelberg:*** Pseudo-dynamic competition with respect to quantity
  - firms are allowed to move ***sequentially***
- ***Collusion:*** Firms act as if they were a monopoly

ευχαριστώ!

(thank you!)

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