Advanced Microeconomics

Introduction to competition policy and regulation

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Competition policy and regulation

1. Themes
2. Markets
3. Models
4. Competition laws

Themes

Main problem: What can the government do to make the market mechanism work better for the consumers?
Relevant questions focus on the following areas:

- How are market prices affected by the number and size of the firms?
- Should firms be allowed to merge?
- How does the number of firms on the market affect innovation?
- How do potential competitors discipline the actual competitors?
- What liability rules will increase product safety and what are the costs?
- Should the government mandate that the underlying structure for network industries (rails, electricity, water) be operated by firms different from those that actually offer the services?
- How are prices for public utilities to be set? Should cross subsidies be allowed?

Markets

The relevant market

Cross price elasticity of demand

- The relevant market contains all products that are close substitutes.
- The cross price elasticity of demand:

$$\varepsilon_{x_g,p_k} = \frac{\frac{\partial x_g}{x_g}}{\frac{\partial p_k}{p_k}} = \frac{\partial x_g}{\partial p_k}\frac{p_k}{x_g}$$

- In case of $\varepsilon_{x_g,p_k} > 0$, goods g and k are called substitutes (Marshallian definition).
- If the cross elasticity is above a certain threshold, k belongs to the market of g.

Markets

The relevant market

- Supply-side substitutes
  - The relevant market includes supply-side substitutes
  - For example, a firm, producing tables from wood, may consider making wooden toys if the price of these toys increases
- SSNIP-Test
  - "small but significant non-transitory increase in prices"
  - Example: butter and margarine: If (hypothetically) all the producers of butter merged, would it be in the interest of the newly-formed butter monopolist to increase the price of butter by 5 to 10%?
    Yes: Margarine is not a sufficiently strong substitute for butter
    No: Margarine is a sufficiently strong substitute for butter = belongs to the same market.
- Price correlation test
  - Proposed by *Stigler/Sherwin (1985)*
  - If two goods belong to the same market, their prices should follow a similar time path.

Markets

Measures of concentration

- Measures of concentration often refer to market shares
- If firm i's output is x_i, its market share is given by

$$s_i := \frac{x_i}{X}, \quad \text{where } X = \sum_{i=1}^{n} x_i$$

- A simple measure of concentration is the rate of concentration C_k $(k \leq n)$:

  Assuming $s_1 \geq s_2 \geq \ldots$, the k-rate of concentration C_k is given by

$$C_k = \sum_{i=1}^{k} s_i$$

Exercise

Determine C_2 for the following examples:

1. *Two firms with equal market shares*
2. *Three firms with market shares of $s_1 = 0.8$, $s_2 = 0.1$ and $s_3 = 0.1$*
3. *Three firms with market shares of $s_1 = 0.2$, $s_2 = 0.2$ and*

Markets

Measures of concentration

- In general, measures of concentration yield 1 for the monopoly case and 0 for perfect competition.
- The rates of concentration fulfill this:
  - For n equally large firms

$$C_k = \frac{k}{n}, k \leq n$$

  - Monopoly: $k = n = 1$ and $\frac{k}{n} = 1$
  - Perfect competition: $n \longrightarrow \infty$ and $\lim_{n \to \infty} \frac{k}{n} = 0$
- Problem: The merger of two firms will not change C_k if the merged firms do not belong to the k largest firms

Markets

Measures of concentration

- The Herfindahl-Hirschman index H *(Hirschman 1964) is given by*

$$H = \sum_{i=1}^{n} \left(\frac{x_i}{X} \right)^2 = \sum_{i=1}^{n} s_i^2$$

- Monopoly: $H = 1^2 = 1$
- Perfect competition: n equally large firms

$$H = \sum_{i=1}^{n} \left(\frac{1}{n} \right)^2 = n \cdot \frac{1}{n^2} = \frac{1}{n},$$

$H = 0$ by $\lim_{n \to \infty} \frac{1}{n} = 0$.

H takes all firms into account while C_k looks at the k largest firms, only.

Exercise

Determine H for the following examples:

1. *Two firms with equal market shares*
2. *Three firms with market shares of* $s_1 = 0.8$, $s_2 = 0.1$ *and* $s_3 = 0.1$
3. *Three firms with market shares of* $s_1 = 0.2$, $s_2 = 0.2$ *and* $s_3 = 0.6$

Exercise

Can we be sure that the Herfindahl index increases when two firms merge?

Markets

Measures of concentration

The Herfindahl index is a function of the number of firms in the market, n, and the variation coefficient, V:

$$H = \frac{1 + V^2}{n}$$

The variation coefficient is defined by

$$V = \frac{\text{standard deviation}}{\text{mean}} = \frac{\sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(x_i - \frac{X}{n}\right)^2}}{\frac{X}{n}}.$$

Problem

Can you show $H = \frac{1+V^2}{n}$? Hint: Express V^2 in terms of n and H!

Models

Introduction

- How are we to judge whether certain market outcomes are good?
- We need to predict market outcomes (positive theory) and to judge them (normative theory)
- We use these models:
  - Perfect competition and the first welfare theorem
  - Cournot monopoly model
  - Structure-conduct-performance paradigm
  - Oligopoly models (Bertrand, Cournot and Stackelberg)
  - Natural monopoly and Ramsey pricing
  - Rate-of-return restriction in the private sector

Models

The structure-conduct-performance paradigm

- Established by *Mason (1939)* and *Bain (1956)* this model introduces three important categories:
- Structure
  - How many firms are there in the market/industry, how concentrated is the market/industry?
  - Do potential competitors face entry barriers?
  - Are the products differentiated?
- Conduct
  - Are prices close to marginal costs?
  - Are the products of high quality? Are they differentiated?
  - What distributional channels do the firms use? Do they offer their products in major cities only?
  - How much do firms spend on advertising?
  - How much do firms spend on research and development?

Models

The structure-conduct-performance paradigm

- Performance
  - Do firms make profits?
  - Are the products safe?
  - Are prices close to marginal costs?
  - Do the firms successfully innovate (process or product innovation)?
- Simple idea: Structure determines conduct and conduct determines performance
- Of course, this is an incomplete picture:
  - Performance influences conduct: profits may be used to finance research and development
  - Performance influcences structure: successful innovation may alter the industry structure through lower costs or different products
  - Conduct influences structure: prices, advertising, or product differentiation may be used to deter entry

Lerner and Herfindahl

- For an individual firm, the Lerner measure is equal to the price-cost margin
$$\frac{p - MC}{p}$$
- Perfect competition: 0
- For the whole industry (n firms), the Lerner measure is
$$\sum_{i=1}^{n} s_i \frac{p - MC_i}{p}$$
- We will show the close relation between the industry Lerner measure and the Herfindahl index

Models

Cournot, concentration, and monopoly power

- Consider one specific firm i in Cournot competition
- Its revenue is given by

$$R(x_i) = p(X) \cdot x_i$$

- In the Cournot model, $dx_j/dx_i = 0$ for $i \neq j$, hence $dX/dx_i = 1$. Therefore, firm i's marginal revenue is

$$\begin{aligned}
\frac{dR}{dx_i} &= p + x_i \frac{dp}{dX}\frac{dX}{dx_i} = p + x_i \frac{dp}{dX} \\
&= p\left(1 + \frac{x_i}{p}\frac{dp}{dX}\right) \text{ (factor out } p\text{)} \\
&= p\left(1 + \frac{x_i}{X}\frac{X}{p}\frac{dp}{dX}\right) \text{ (multiply by } X/X\text{)} \\
MR_i(x_i) &= p\left(1 - s_i \frac{1}{|\varepsilon_{X,p}|}\right) \text{ (apply definitions)}
\end{aligned}$$

Models

Cournot, concentration, and monopoly power

- In a Cournot equilibrium

$$MC_i = MR_i\left(x_i\right)$$

- Lerner index for firm i in equilibrium is

$$\frac{p - MC_i}{p} = \frac{p - p\left(1 - \frac{s_i}{|\varepsilon_{X,p}|}\right)}{p} = \frac{s_i}{|\varepsilon_{X,p}|},$$

- The industry Lerner index equals

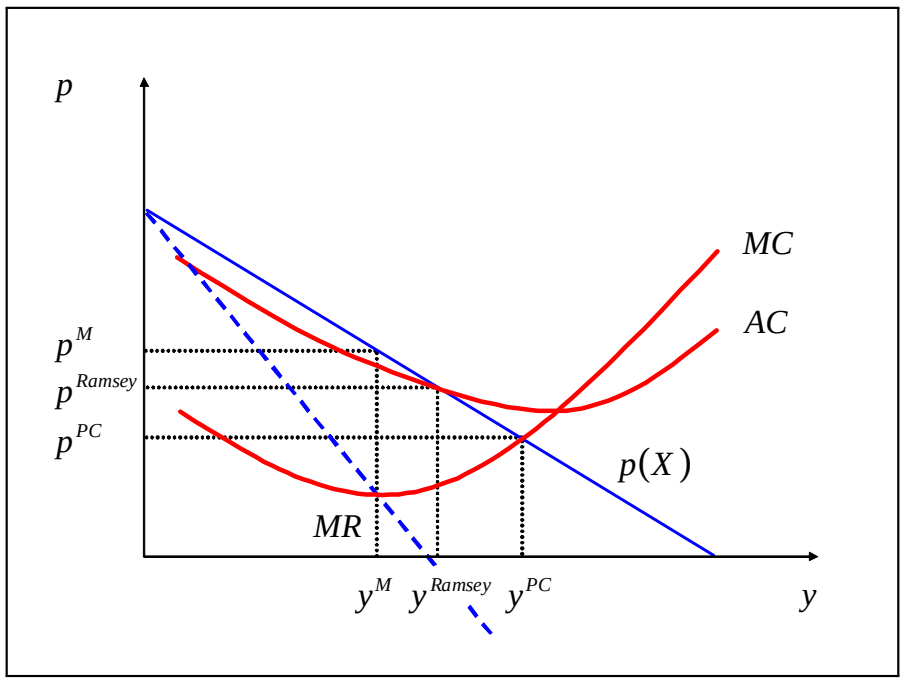
$$\sum_{i=1}^{n} s_i \frac{p - MC_i}{p} = \sum_{i=1}^{n} s_i \frac{s_i}{|\varepsilon_{X,p}|} = \frac{1}{|\varepsilon_{X,p}|} \sum_{i=1}^{n} s_i^2 = \frac{H}{|\varepsilon_{X,p}|}$$

- Thus, the industry Lerner degree of monopoly power is the higher,
  - the less elastic market demand and
  - the more concentrated the market

Models

Natural monopoly and Ramsey prices

- Natural monopolies: one firm is best suited to serve the market at minimal cost



- three prices:
  - the monopoly price p^M,
  - the marginal-cost, or perfect-competition, price p^{PC}
  - the Ramsey price p^{Ramsey}

Models

Natural monopoly and Ramsey prices

- p^{PC}: welfare-maximizing, but negative profits
- p^{Ramsey} : Choose the welfare-maximizing prices compatible with nonnegative profits
- Problems:
  - Informational requirements (cost function, elasticity)
  - Cost functions are given and not subject to the behaviour of the public utilities
  - Ramsey pricing does not take account of distributional issues

Models

Restricting the rate of return in the private sector

- The government may try to impose maximal cash-flow returns or maximal returns on profits
- The Averch-Johnson (1962) model shows that this may lead to an inefficient use of the factors of production
- Definitions:

$$\text{cash-flow return} = \frac{\text{revenue} - \text{labor costs}}{\text{capital}}$$

$$\text{return on profit} = \frac{\text{profit}}{\text{capital}}$$

  - K : Capital L : Labor
  - i, w : factor prices
  - $R(K, L)$: revenue obtainable

Models

Restricting the rate of return in the private sector

- Firm's profit

$$\Pi(K, L) = R(K, L) - wL - iK$$

- If the government imposes a maximal cash-flow return of s, capital and labour are to be chosen in accordance with

$$\frac{R(K, L) - wL}{K} \leq s.$$

- By

$$\begin{aligned} & \frac{R(K, L) - wL}{K} \leq s \\ \Leftrightarrow \quad & R(K, L) - wL \leq sK \\ \Leftrightarrow \quad & R(K, L) - wL - iK \leq (s - i) K \\ \Leftrightarrow \quad & \frac{\Pi(K, L)}{K} \leq s - i \end{aligned}$$

a cash-flow return of s corresponds to a profit return of $s - i$

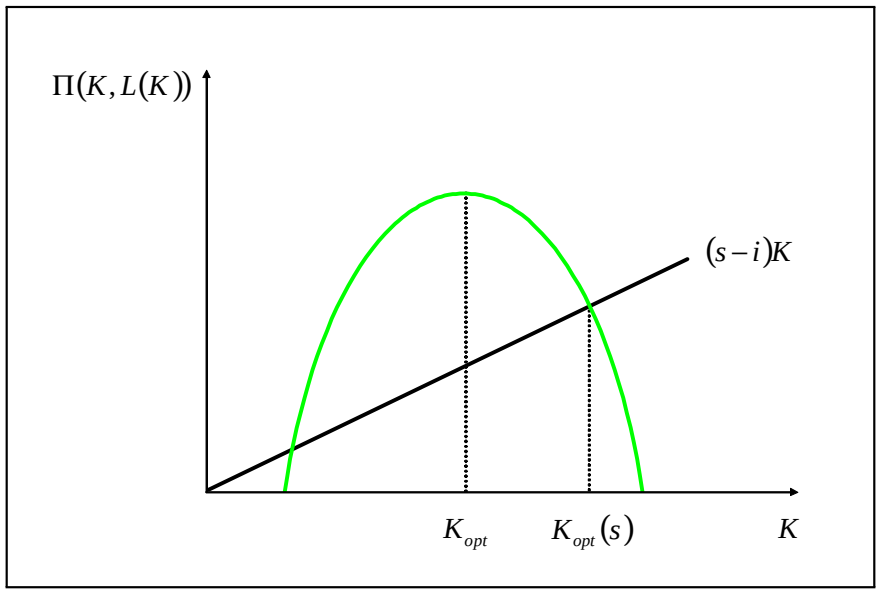
Models

Restricting the rate of return in the private sector

- The maximal profit attainable is

$$\pi\left(K, L\right) = \left(s - i\right) K$$

- The firm has an incentive to substitute labor by capital



- Profit is depicted as a function of capital K where labor $L\left(K\right)$ is chosen optimally for the respective level of capital

Overall concepts of competition (policy)

Classical liberalism

- Adam Smith favors open markets
- He does not advocate a specific anti-cartel or anti-merger policy
- He identifies sectors where competition would not work and where the government has to provide these goods: streets, bridges, canals, ports, postal services, water

Perfect competition and general equilibrium

- According to this theory, many small firms produce quantities by equalizing marginal cost and price

Overall concepts of competition (policy)

Freiburg school of "ordoliberalism"

- *Walter Eucken (1990, p. 255-299)* not only favors liberal principles such as open markets, private property, and freedom of contract, but also advocates a "Monopolamt"
- The German "Act against Restraints of Competition" (Gesetz gegen Wettbewerbsbeschränkungen) is partly inspired by Eucken's ideas

Chicago school of antitrust policy

- Argues that cartels, mergers and other business practices are beneficial to consumers
- Main problem is that monopoly power is bestowed by the government
- Ronald Coase tired of anti-trust because "when the prices went up the judges said it was monopoly, when the prices went down, they said it was predatory pricing, and when they stayed the same, they said it was tacit collusion."

Overall concepts of competition (policy)

Harvard school of workable competition

Starting from the structure-conduct-performance pradigm, the Harvard scholars try to identify structural elements that lead to a good or bad performance

Contestable markets

While the model of perfect competition deals with actual competition, contestable-markets theory focuses on potential competition in an extreme manner

Kantzenbach's model

- *Erhard Kantzenbach(1966)* argues that competition intensity depends on how fast firms react to advances of other competitors
- Since cartelization is more likely with a small number of firms, the so-called effective competition intensity is maximized for 4 to 6 competitors

Overall concepts of competition (policy)

The Austrian school

- ...does not subscribe to the way competition is portrayed in models of perfect competition
- Instead,
  - F. A. von Hayek insists on the importance of ongoing change in an economy and on competition as a discovery procedure (what would the use of competition be if all the relevant facts were given?)
  - Israel Kirzner stresses the importance of entrepreneurial discovery

Schumpeter

Joseph Schumpeter describes economic change as a process of creative destruction

Freedom and competition

Hoppmann (1966) stresses the freedom of competition ("Wettbewerbsfreiheit"). While competition may further economic welfare, this fact should not be the main argument in favor of competition policy

Competition laws

European competition laws

- Articles 81 through 86 from the Treaty of the European Commission contain the main regulative principles of the European competition policy.
- According to article 81, anti-competitive agreements are prohibited unless they are necessary for the attainment of beneficial effects, a fair share of which accrue to consumers
- Article 82 deals with the abuse of a dominant position

German competition laws

- The German law against the restriction of competition (Gesetz gegen Wettbewerbsbeschränkungen, GWB) enforces similar rules:
  - The first section of the first part corresponds to article 81
  - The second section of the first part is close to article 82
  - The third section of the first part is concerned with the relationship between the German and the EU law