Introduction

Christian W. Bach

University of Liverpool & EPICENTER

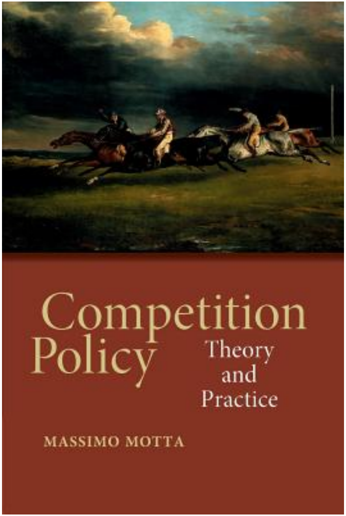
Schedule

- 23.02.18: *Introduction*
- 09.03.18: *Market Power and Efficiency*
- 13.04.18: *Collusion*
- 27.04.18: *Exercise I*
- 11.05.18: *Mergers*
- 18.05.18: *Vertical Restraints*
- 25.05.18: *Exercise II* and *Economic Consulting / Career Advice*

Organization

- Pre-requisite:
  - basic knowledge of *game theory*
  - basic oligopoly models of *industrial organization* such as Bertrand, Cournot, Stackelberg, and Repeated Bertrand
  - Required background reading: Motta (2004), chapter 8, *A Toolkit: Game Theory and Imperfect Competition Models*
- Material:
  - Slides (downloadable on `http://www.epicenter.name/bach`)
  - Textbook on Competition Policy (`http://www.cambridge.org/gb/academic/subjects/economics/industrial-economics/competition-policy-theory-and-practice`)
- Assessment: two hour written exam (closed book)
- In case of *any* questions: cwbach@liv.ac.uk

Textbook



Competition Policy

- Basic motivation: belief that competition between firms is the most beneficial market structure for society as a whole. *(e.g. lower prices, many goods, innovation, high quality, etc)*
- Hence, competition should be promoted in the economy and anti-competitive practices should be regulated.
- Competition policy = all policies & laws to actually ensure that competition is not restricted in the markets to reduce welfare.
- The course focuses on the microeconomics this field is built on.
- Nowadays, competition policy is highly relevant in the real world and the corresponding economic concepts are extensively used.
- Indeed, competition policy has become an exciting professional field for microeconomists (authorities, economic consulting, etc.)

Competitive Benchmark

- **Perfect competition:**
  many firms sell one good, while the price is given by the market, and cannot be influenced by a single firm.

- Let q, p^{com}, and $C(q)$ denote output, competitive price, and production costs, respectively.

- Profit maximization

$$\max_q \pi(q) = q \cdot p^{com} - C(q)$$

$$\frac{d\pi}{dq} = p^{com} - \frac{dC}{dq} \stackrel{!}{=} 0$$

$$p^{com} = \frac{dC}{dq}$$

Monopoly

- **Simplest model of imperfect competition:** one firm sells one good.

- Let q, p, and k denote output, price, and production costs, respectively.

- Demand function
$$q = D(p)$$
such that $\frac{dD}{dp} < 0$, i.e. demand is negatively-sloped. *("ordinary good")*

- Cost function
$$k = C(q)$$
such that $\frac{dC}{dq} \geq 0$, i.e. marginal costs are non-negative.

Example With Linear Functions: Price Choice

- Demand function

$$D(p) = a - b \cdot p$$

where $a, b > 0$

- Cost function

$$C(q) = c \cdot q$$

where $c < \frac{a}{b}$, otherwise nobody would buy even at marginal cost (For simplicity sake no fixed costs are assumed).

- Profit maximization

$$\max_{p} \pi(p) = (p - c) \cdot (a - b \cdot p)$$

$$\frac{d\pi}{dp} = a - 2 \cdot b \cdot p + b \cdot c \overset{!}{=} 0$$

$$p^M = \frac{a + b \cdot c}{2 \cdot b} \quad \text{and thus} \quad q^M = \frac{a - b \cdot c}{2}$$

Example With Linear Functions: Quantity Choice

- Suppose that the monopolist sets the quantity.
- The inverse demand function is $p = \frac{a}{b} - \frac{q}{b}$.

$$\max_q = \pi(q) = (\frac{a}{b} - \frac{q}{b} - c) \cdot q$$

$$\frac{d\pi(q)}{dq} = \frac{a}{b} - \frac{2 \cdot q}{b} - c \stackrel{!}{=} 0$$

$$q^M = \frac{a - b \cdot c}{2} \quad \text{and thus} \quad p^M = \frac{a + b \cdot c}{2 \cdot b}$$

Example With Linear Functions: Marginal Reasoning

- The monopolist's revenue is quadratic and given by

$$R(q) = p \cdot q = (\frac{a}{b} - \frac{q}{b}) \cdot q = \frac{a \cdot q}{b} - \frac{q^2}{b}$$

- Note that marginal revenue is

$$\frac{dR}{dq} = \frac{a}{b} - \frac{2 \cdot q}{b}$$

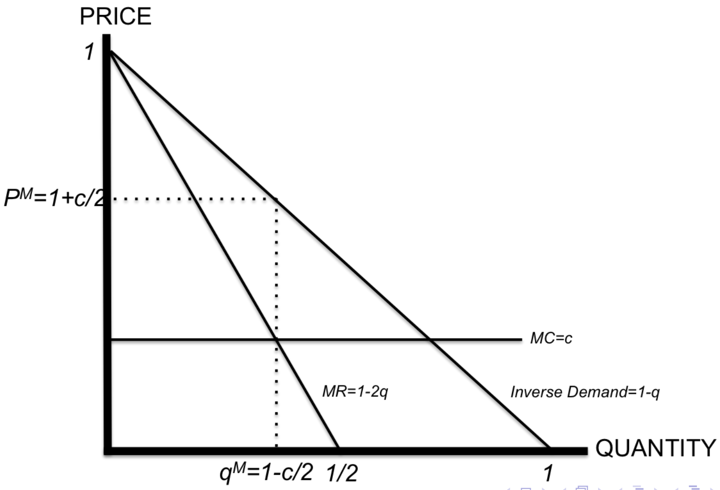
- A profit-maximizing monopolist sets a quantity such that marginal revenue equals marginal costs.

$$\frac{a}{b} - \frac{2 \cdot q}{b} = c$$

$$q^M = \frac{a - b \cdot c}{2} \quad \text{and thus} \quad p^M = \frac{a + b \cdot c}{2 \cdot b}$$

Example With Linear Functions: Illustration

Graphical illustration with $a = b = 1$, i.e. $D(p) = 1 - p$



Example With Linear Functions

- The profit-maximizing outcome is invariant to price-setting, quantity-setting, or marginal reasoning in the linear setting.
- Note that $\frac{dp^M}{dc} > 0$, i.e. the higher the marginal cost, the higher the monopoly price.
- Thus, it is better for consumers to face an efficient monopolist than an inefficient one.

General Case: Profit-Maximization With Price

- Assume that $\frac{d^2D}{(dp)^2} \leq 0$ and $\frac{d^2C}{(dq)^2} \geq 0$, so that the profit function $\pi = p \cdot D(p) - C\big(D(p)\big)$ is concave and thus exhibits a maximum.

- Suppose that the monopolist's objective is profit-maximization and that he sets the price:

$$\max_p \pi(p) = p \cdot D(p) - C\big(D(p)\big)$$

- The first-order conditions yield

$$\frac{d\pi(p)}{dp} = p \cdot \frac{dD(p)}{dp} + D(p) - \frac{dC\big(D(p)\big)}{dD(p)} \cdot \frac{dD(p)}{dp} \stackrel{!}{=} 0$$

$$p^M = \frac{dC\big(D(p)\big)}{dD(p)} - \frac{D(p)}{\frac{dD(p)}{dp}}$$

General Case: Profit-Maximization With Quantity

- Let $p = D^{-1}(q)$ be the inverse demand function.
- Suppose that the monopolist's objective is profit-maximization and that he sets the quantity:

$$\max_q \pi(q) = D^{-1}(q) \cdot q - C(q)$$

- The first-order conditions yield

$$\frac{d\pi(q)}{dq} = D^{-1}(q) + \frac{dD^{-1}(q)}{dq} \cdot q - \frac{dC(q)}{dq} \overset{!}{=} 0$$

$$p^M = D^{-1}(q) = \frac{dC(q)}{dq} - \frac{q}{\frac{dq}{dD^{-1}(q)}}$$

- In general, the result is invariant to whether the monopolist is choosing price or quantity!

Lerner Index as a Measure of Market Power

- The Lerner index (also called relative mark-up)

$$\frac{p - \frac{dC(q)}{dq}}{p}$$

  is a measure of market power: it measures the ability of a firm to set prices above marginal costs.

- Note that dividing the first-order conditions $p^M = \frac{dC\big(D(p)\big)}{dD(p)} - \frac{D(p)}{\frac{dD(p)}{dp}}$ of the monopolist by p implies that

$$\frac{p - \frac{dC(q)}{dq}}{p} = \frac{1}{\epsilon}$$

  where $\epsilon := -\frac{dD(p)}{dp} \cdot \frac{p}{D(p)}$ denotes the price elasticity of demand.

- Thus, the higher the price elasticity of demand, the lower the monopolist's market power (i.e. its relative mark-up).

Price Elasticity of Demand and Mark-Up

1. If $\epsilon \rightarrow 0$, i.e. demand is so inelastic that consumers would be willing to buy the good at whatever price, then the relative mark-up tends to ∞.

2. If $\epsilon \rightarrow \infty$, i.e. demand is so elastic that consumers would stop buying whenever the monopolist only infinitesimally increases his price, then he prices at marginal costs and his mark-up is 0.