Industrial Organization
Introduction

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Syllabus of the course

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Bibliography:

- Luis Cabral "Economía Industrial" McGraw-Hill 1997. There is an english version http://luiscabral.org/iio/about_book/
- Jeffrey Church and Roger Ware "Industrial Organization: A Strategic Approach" McGraw-Hill, 2000.
- Roger Clarke "Industrial Economics" Blackwell 1999.
- Oz Shy "Industrial Organization: Theory and Practice" The MIT Press 1996
- Jean Tirole "The Theory of Industrial Organization" The MIT Press 1990.

1.Introduction

First of all: what is Industrial Organization?

Industrial Organization (IO) studies markets (industrial, agriculture and services), in particular those markets that are not perfect i.e. that depart from perfect competition.

1. Introduction

What type of questions do we want to answer in IO?

Example 1: Is there market power in the pharmaceutical industry?

1. Introduction

Example 2: Why do automobile firms keep selling cheap automobiles even when its cost is higher than its price?

Brand repetition in last sale	
Spain	26,1%
France	53,9%
Belgium	50,8%

1.1. Concentration Measures

In the majority of markets, the level of competition lies between the two extremes of **Perfect Competition** (minimum concentration) and **Monopoly** (maximum concentration). Concentration measures offer a simple way to measure the proximity of the competition level of a given market to these two extremes.

2 reasons why concentration measures are useful:
➢ To compare different markets (inside and outside the country)
➢ To help in market regulation. The regulator needs to assess the level of competition of markets in order to safeguard the consumer's welfare.

1.1. Concentration Measures

Concentration Indices should be:

➢ Easy to compute

➢ Independent of the market size

➢ Easy to interpret for example if the range is an interval:

$$\in [0,1]$$

Perfect Competition   *Monopoly*
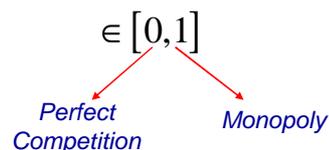
1.1. Concentration Measures

Concentration measures are related to concentration curves

A concentration curve describes the relation between the accumulated percentage of the total production/sales in the market and the accumulated number of firms in the market ordered according to the firms' size.

1.1. Concentration Measures

The inequality in firms' sizes is expressed by the concavity of the concentration curve

Straight lines = equal size firms (lowest concentration)
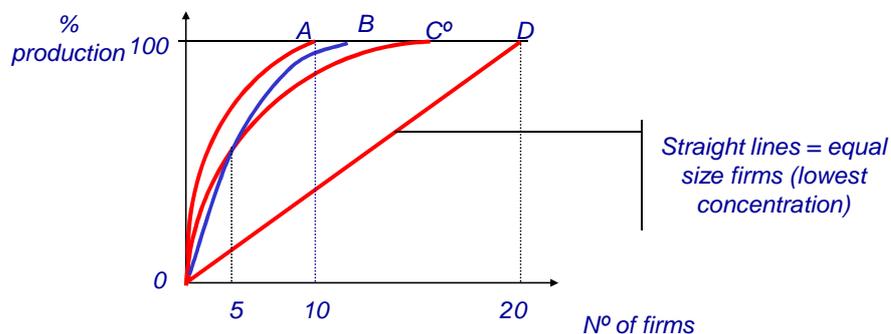
Market A is the more concentrated; Market D is the least concentrated; The curves B and C lead to an ambiguous classification (market B has less firms but less size inequality).

1.1. Concentration Measures

Hannah and Kay (1977) listed the characteristics that a concentration index should have (notice that the concentration index is a summary of the information contained in the curve):

A. Classification according to the concentration curve: For example, the index should classify market A as more concentrated than market B.

B. Principle of Transfer of Sales: A transfer of sales from a small firm to a large one should increase the concentration index

1.1. Concentration Measures

C. Entry condition – The entry of a small firm (keeping constant the relative shares of the existing firms) should decrease the concentration index. The opposite in the case of an exit of a small firm.

Note: The entry of a sufficient large firm may increase concentration. Ej. Xerox in the photocopy machines market.

D. Merger Condition – The merger of 2 or more firms should increase the concentration index since the merger may be decomposed as ≈

Transfer of sales   +   exit of the smallest firm

↑ concentration   ↑ concentration
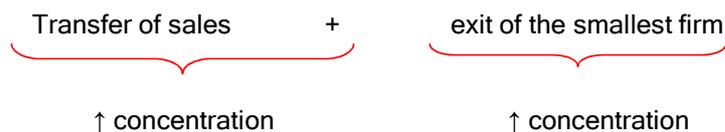
1.1. Concentration Measures

Examples of Concentration Indices:

1. **The inverse of the number of firms =** $\dfrac{1}{n}$
    1. Ideal when all firms in the market are of the same size
    2. Only uses information about one point on the concentration curve, the point where the concentration curve crosses the line of 100% accumulated production.
    3. Does not satisfy the Hannah and Kay criteria of "transfer of sales" since a transfer of sales (keeping the number of firms constant) does not affect the index.

1.1. Concentration Measures

2. **The Concentration Ratio = Cr - is the sum of the market shares of the largest r firms in the market**

$$C_r = \sum_{i=1}^{r} s_i \text{ where } s_i = \frac{q_i}{Q}$$

- **It is easy to compute since we only need information on the r largest firms**
- **It is easy to interpret since:** $\in \left[\dfrac{r}{n}, 1 \right]$

*Minimum concentration – n equal size firms, $s_i=1/n$*

Maximum concentration
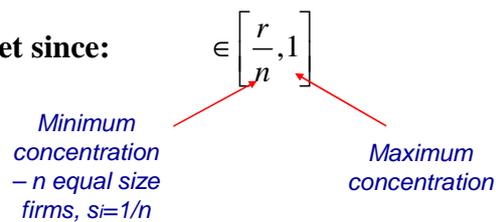
1.1. Concentration Measures

Critics to the Concentration Ratio = Cr :

1. **r is arbitrarily chosen**
2. **Only takes information from 1 point of the concentration curve. For example industries B and C have different ranking depending on the value of r**
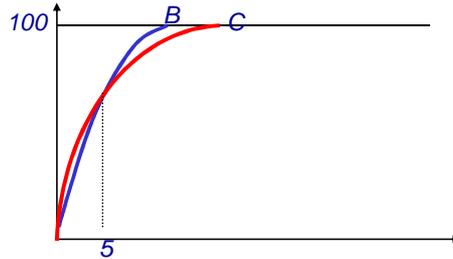
$$r=5 \; Cr(B)=Cr(C)$$
$$r<5 \; Cr(C)>Cr(B)$$
$$r>5 \; Cr(B)>Cr(C)$$

1.1. Concentration Measures

3. **A transfer of sales may not affect the index. The index may take the same value for two industries when in fact one of them is much more concentrated than the other. For example, in the next table, the two industries have the same C$_4$ but industry 1 is more concentrated than 2.**

Table 1	S_1	S_2	S_3	S_4	S_5	C_4
Industry 1	0.6	0.1	0.05	0.05	0.05	0.8
Industry 2	0.2	0.2	0.2	0.2	0.2	0.8

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1.1. Concentration Measures

3. Hirschman-Herfindahl index

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

1. Takes into account all points of the concentration curve (it is therefore harder to compute since ones needs information on all firms in the market)

1. Satisfies all the criteria of Hannah and Kay

2. H=1 (monopoly) and H=1/n → 0 (for the case of many firms of equal size – perfect competition)

1.1. Concentration Measures

4. $n^* = \dfrac{1}{H}$ = Equivalent Number (n*), represents the number of equal-sized firms that would give rise to the same value of the concentration index (H). n* facilitates the interpretation of the concentration index. For example H= 0.385 $\Rightarrow$ n*=2.59 (this means the market is as concentrated as a market with n* firms of equal size)

5. Gives more weight to larger firms (in the formula the weight to each market share is the market share).

1.1. Concentration Measures

Table 2	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	H
Industry 1	0.6	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.385
Industry 2	0.2	0.2	0.2	0.2	0.2	0	0	0	0.2

Contrary to the result obtained using C_4, H shows that industry 1 is more concentrated than industry 2

1.1. Concentration Measures

TABLE 17-1   Concentration in Selected Manufacturing Industries: 1992

SIC	Industry	C_4	C_8	HHI	N	Shipments (in $ billions)
2834	Pharmaceutical preparations	26	42	341	583	50.4
2043	Cereal breakfast foods	85	98	2,253	42	9.8
2841	Soaps and detergents	63	77	1,584	635	14.8
2851	Paints	29	43	305	1,129	15.0
2911	Petroleum refining	30	49	414	131	136.6
3571	Computer and office equipment	45	59	680	803	38.2
3674	Semiconductors	41	58	541	823	32.1
3711	Passenger cars	84	91	2,676	398	151.7
3721	Aircraft and parts	79	93	2,717	151	62.9
3861	Photographic equipment	78	83	2,408	832	22.1

Source: U.S. Bureau of the Census, "Concentration Ratios in Manufacturing," *1992 Census of Manufacturers,* Report MC92-S-2.

Maximum concentration   *Minimum concentration*

1.1. Concentration Measures

Problems with the concentration measures:

1. Cross-ownership – For example the English cement market in 1978.

Firm	Share
APCM	58,0
RPC	16,5
Tunnel	10,5
Ribblesdale	5,0
Aberthaw	5,0
Ketton	5,0

However, APCM had 26% of Aberthaw, Ward had 100% of Ketton and 90% of Tunnel, which was the owner of Ribblesdale. If these share represent the control of firms then....

1.1. Concentration Measures

The correct reading of the table should be…

Firm	Share
APCM	63,0
Ward	20,5
RPC	16,5

And the concentration indices would come out very different.

1.1. Concentration Measures

2. The concentration measures depend on the definition of the relevant market.
   Ex. Spanish versus European

   Ex. The US Government had a case against IBM. The US Government claimed that IBM had a dominant position in the *mainframe market*. In 1983 the market shares in this market were:

IBM	64%
Burroughs	11%
Honeywell	6%
NCR	6%
Otros	13%

   IBM argued that its relevant market was data processing, which included PCs. In this larger market its share was only of 39%

1.1. Concentration Measures

Other examples of *antitrust cases where the market definition is crucial*.

Firm	Large market	Quota	Smaller Market	Quota
Dupont (1956)	Packaging material	<20%	Cellophane	>75%
Philadelphia National Bank (1963)	U.S.A	<4%	Philadelphia	36%
Xerox (1975)	Copy machines	65%	Plain paper Copy machines	>90%

1.1. Concentration Measures

Market Definition:

- Important in merger or other antitrust cases, economists are called to define the relevant market.

- The market definition usually has two components:
  - Geographical
  - Product

- How the market is defined as we saw usually determines the outcome of antitrust cases.

1.1. Concentration Measures

Product market definition:

- Should include all those goods that are close demand or supply substitutes.

- Product B is a *demand substitute* for A if an increase in the price of A causes consumers to demand more B.

- Product B is a *supply substitute* for A if, in response to an increase in the price of A, firms that are producing B switch some production to A (increasing the total supply of A).

- In both cases, the presence of B constraints the pricing of A

1.1. Concentration Measures

Product market definition (cont):

- First steps in the definition of markets:
    - Other things one may do to define a market is to ask people in the industry about rivals and other products
    - Prices of goods in the same market tend to move together (but watch out for exceptions: the prices of two goods not in the same market but that use the same input, say oil, may be highly correlated; and the opposite, two goods that are in the same market but use different inputs may not have a high correlation).
    - Usage of cross price-elasticities, the effect of a rise in 1% in the price of good B in the demand for good A. If cross elasticities are high, then good B is seen as a substitute for A and, therefore, in the same market as A.

1.1. Concentration Measures

Geographic market definition:

- The limits are found by checking whether the price in one location affects the price in another location. If so, then both locations are in the same market.

1.1. Concentration Measures

3. Static measures which do not reflect the evolution of markets over time. For example, if a market has always a dominant firm but this firm is not always the same and in fact changes frequently, it may indeed be a quite competitive market. To measure market stability.

$$I = \sum_{i=1}^{n} \left| s_{it+1} - s_{it} \right|$$

1.1. Concentration Measures

- Market Power: a firm or group of firms has market power if it is profitable to charge a price above the one that would prevail under perfect competition (usually equal to marginal cost). Under this definition most firms have some market power. Hence when courts have a case it means firms have substantial market power for a significant period of time. Unfortunately, the accepted limit over marginal cost is not set, is 5% too much? Or is 10% acceptable?
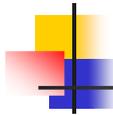
1.1. Concentration Measures

- To assess whether price is above marginal cost one has to be able to measure or estimate marginal cost. This is usually hard.

- Alternatively estimate the price-elasticity of the residual- demand. This summarizes the ability of the firm to raise prices and still keep some of its demand in other words its market power. If the elasticity is high, little market power, if low then a lot of market power.

1.1. Concentration Measures

- Most empirical studies find residual-demand elasticities of no more than 5 or 10, which implies (using the monopolists' optimal pricing formula) that price is between 25% and 11% above marginal cost

$$\frac{p - MC}{p} = \frac{1}{\varepsilon_i} = \frac{1}{5} \Leftrightarrow p = \frac{5}{4} MC$$

$$\frac{p - MC}{p} = \frac{1}{\varepsilon_i} = \frac{1}{10} \Leftrightarrow p = \frac{10}{9} MC$$

1.1. Concentration Measures

- In some cases economists can neither estimate marginal costs nor residual demand elasticities. In those cases market shares and concentration measures are used. High market shares are usually taken as evidence of market power (BUT market shares are imperfect indicators of market power).

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