Industrial Organization 06
Market structure and market power

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Introduction

Remember, from the lecture on Monopoly:

Definition of "market power"

The ability of a firm to raise its price over marginal cost.

Importance of measuring "market power":

- In competition policy, some practices (for instance, bundling) are illegal if a firm has market power.

In order to estimate the market power of a firm, we need to define first the relevant market.

Definition of the relevant market

Two questions:

Product market

Which products should we include in the "market"?

Geographical market

Which geographical zone do we have to consider?

An economic definition of the market

A market can be defined as a group of products presenting strong demand-substitutability and supply-substitutability.

Definition of the relevant market

Definition of the European Commission (1997)

The relevant market includes all the products and/or services considered as interchangeable or substitutable on the account of product characteristics, price, and regular use.

Two types of substitution:

- On the demand side: products perceived as substitutes by consumers.
- On the supply side: suppliers that produce other types of good can start operating in the market in case of a price increase.

Demand-side and supply-side substitutability

Example 1: papers of different qualities

Demands are different for low and high qualities of paper.

But there is a potential for substitutability on the supply side.

Example 2: Nestlé/Perrier merger (1992)

What is the relevant market? Does mineral water and soft drinks belong to the same market?

- Demand-substitutability: no, needs and characteristics are different.
- Supply-substitutability: no, strong and specific constraints for mineral water.

Product market

An often used handful test: "Small but Significant Non-transitory Increase in Prices" (SSNIP) test (called also "the hypothetical monopoly test").

The test

Consider a hypothetical monopolist in market X. Could the monopolist profit from a price increase of 5 to 10%?

- If yes: X is a distinct market
- If no: X is not a distinct market; let's introduce another substitute (Y) and redo the test.

Product market

The SSNIP test is sensitive to the Cellophane Fallacy problem (The *bridge* case):

Strong cross price-elasticities between cellophane and other packing materials.

Problem: "usual" price vs "competitive" price.

$\rightarrow$ If we start from the monopoly price, an increase of the price will automatically reduce the demand. The result would support that the relevant market is too large.

Circumstantial evidence

In parallel with the usage of cross-elasticity, competition authorities use a group of circumstantial evidence :

- Price correlation over time (ex: correlation of 0.85 to 1 for mineral waters, very weak or even negative correlation between mineral waters and soft drinks)
- Differences in price (ex: large differences in price between mineral waters and soft drinks as a an evidence of separate markets).
- Nature of the need satisfied (ex: cosmetics sold in pharmacy compared to cosmetics sold in supermarket)
- The geographical market
- Measure of concentration ratios
- ...

Definition of the geographical market

Elements:

- Role of the import
- Transportation costs
- Other characteristics

Example : Nestlé/Perrier

Geographical market = France, because:

- Few trades between European states
- Transportation cost for mineral water is high compared to the value of the good
- Entry to the French market is difficult: a mature market, brands are well established.

Definition of markets in telecommunications

1998-2002 Framework:

- Directives 1992
- Transposition in the 1996 French Telecommunication regulation law
- Measure of market power only by the market share (without taking account other elements)

2002-2010 Framework:

- European Union Telecommunications Framework of 2002 + 2003 and 2007 recommandations
- Transposition in the French Electronic Communications Law of 2004
- Principle of market analysis: market definition, market analysis, proportional remedies
- Definition ex ante of 18 markets and definition of potential new markets

An example in the telecommunications industry

- In the broadband market, wholesale access to the legacy copper network is regulated.
- Question: should we also regulate access to cable networks?
- More recently: should we apply the same remedies for optical fiber and ADSL networks?
- This brings to the issue of market definition: do cable and ADSL belong to the same market?
- Various answers of national regulators: some of them include fiber and ADSL in the same market, some others don't.

Business classification systems

For national accounting needs, statistic institutes are also brought to define the markets.

- NAF codes in France (Nomenclature des Activités Françaises): 712 classes
- NACE codes in Europe: 730 classes
- NAICS codes (North American Industry Classification System) in the US

Concentration and market power

Once the market is defined, we can determine if there is a market power.

We need to choose a measure of the market power.

We also have to search for characteristics favorable towards market power.

Concentration ?

Cournot oligopoly with N firms

If we take the number of firms as a proxy of the market power...

Let's consider the following model:

- An oligopoly with N symetric firms
- The inverse demand function is $p = P(Q) = 1 - Q$
- The cost function (identical for all firms) is $C(q_i) = cq_i$

The equilibrium price is

$$p^* = c + \frac{1 - c}{N + 1}.$$

Cournot oligopoly with N firms

In this model, how many firms should play in the market so that it can be considered as "competitve"?

The following table shows the percentage of the deadweight loss in the case of N firms in Cournot competition compared to the deadweight loss in monopoly.

N	%
1	100%
2	44%
3	25%
4	16%
7	6%
15	1,5%

$\rightarrow$ We see that in this model, few firms suffice to make the market competitive.

Concentration and market power

Until now, we have measured:

- Concentration by: the number of firms in the industry
- Market power by: the margin and the margin ratio

Issues with this approach?

Differences in cost? in size?

- Differences in cost → differences in the margin ratio
- Differences in size → the number of firms is not a good index for market concentration

Measure of market power

Lerner index

$$L = \sum_{i=1}^{N} s_i \frac{p - Cm_i}{p}$$

where s_i represents the market share of firm i

Issues:

- Estimation of marginal cost
- A firm can have a low Lerner index eventhough she has a strong market power (Why?) (i) high costs to maintain its market power (inefficiency), (ii) low price because of predatory behavior.

Measure of market power

It is difficult to directly calculate the Lerner index (need information about costs) → Estimation of Lerner index by demand elasticity.

Indirect measures (traditional) of market power:

- Market shares
  - Market share below 40%: probably non dominant position
  - Above 50%: probably dominant position
- Potential competition
- Countervailing buyer power

Measure of concentration

Different measures are possible:

- The number of firms, but it is a poor measure : 33-33-33 vs 98-1-1
- The coefficient C_m: sum of market shares of the m biggest firms

$$C_m = \sum_{i=1}^{m} s_i.$$

- But not insensitive to differences in market shares:

	s_1	s_2	s_3	s_4
$C_4 = 80$	60	10	5	5
$C_4 = 80$	20	20	20	20

	s_1	s_2	s_3	s_4
$C_4 = 100$	100/3	100/3	100/3	–
$C_4 = 98.5$	49	49	0.25	0.25

Measure of concentration

The Herfindahl index (or Herfindahl-Hirschman, HHI):

$$H = \sum_{i=1}^{N} (s_i)^2 \,.$$

HHI is sometimes used multiplied by 10,000

Measure of concentration

Herfindahl index

$$H = \sum_{i=1}^{N} (s_i)^2 \, .$$

Particular case: If there are N identical firms, what is the value of the Herfindahl index?

$$1/N$$

We can apply this rule to estimate an "equivalent for symmetric firms" (for instance: an index H of 1,000 is equivalent to the HHI concentration of a market with 10 symmetric firms).

Measure of concentration

The Antitrust Division of the Department of Justice (DOJ) in the US considers:

- $H < 1,000$: non-concentrated industry
- entre $1,000$ et $1,800$: little concentrated industry
- $> 1,800$: concentrated industry

Some examples, in 1997 in the US (C4, C8, HHI)

- Meats: 35, 48, 393
- Breakfast cereals: 83, 94, 2,446
- Computers: 40, 68, 658
- Cigarettes: 99, nd, nd
- Automobile part: 87, 94, nd
- Oil refinery: 29, 49, 422

Measure of concentration

Reminder: in a Cournot oligopoly

$$L_i = \frac{s_i}{\varepsilon}$$

What is the value of Lerner index?

We have

$$L = \sum_{i=1}^{N} s_i L_i = \sum_{i=1}^{N} \frac{(s_i)^2}{\varepsilon} = \frac{H}{\varepsilon}$$

$\rightarrow$ This result suggests a relationship between Market Structure (H) and Market Power (L).

The SCP paradigm

The SCP paradigm (Harvard School) suggested a relationship between Structure, Conduct an Performance.

- Structure: the level of concentration, cost structure, etc.
- Competitive conducts: prices, investments, etc.
- Market performance: market power, allocative efficiency.

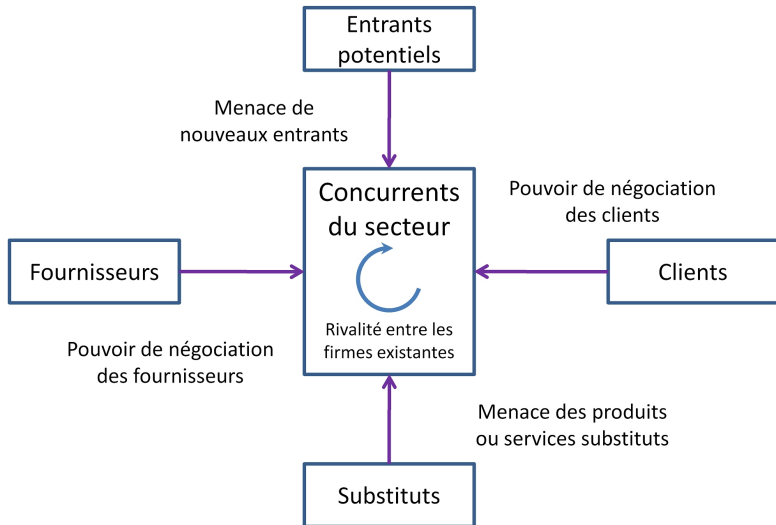Assumption : S $\rightarrow$ C, S $\rightarrow$ P and C $\rightarrow$ P

The SCP paradigm

	Strongly competitive market	Oligopolistic market
Structural characteristics	Lots of vendors and buyers. Homogeneous products No entry barriers	Few firms with potential concentration of buyers. Rather differentiated products. Existence of entry barriers
Firms conduct	No autonomous actions of actors	Conducts are variable. Existence of better profits than in a competitive situation
Expected performances	Optimal allocation of factors. No innovation	Non optimal allocation of factors. Potential innovation

The SCP paradigm

- S → C: for example, collusion is more likely when there is a few number of firms
- C → P: the stronger competition between firms is, the more efficient the market is
- S → P: if we take the Cournot model, the lower H is, the weaker L is, which means that the market is more efficient.

The SCP paradigm and Porter's 5 forces (1979)

Entrants potentiels

Menace de nouveaux entrants

Concurrents du secteur

Rivalité entre les firmes existantes

Pouvoir de négociation des clients

Fournisseurs

Clients

Pouvoir de négociation des fournisseurs

Menace des produits ou services substituts

Substituts

The SCP paradigm: Empirical evidence

In order to prove the idea of the SCP paradigm, we need to show that there is a relationship between structure and performance, that is, a relationship between concentration and market power.

This has been tested but only a weak relation was shown.

Data issues:

- No measure of margins $\rightarrow$ use of ratios from accounting data
- Lots of firms playing on several markets: how to allocate the numbers between the different markets where they play?
- ...

Simultaneity problem

Also some issues in the interpretation :

- Simultaneity problem: there are direct and indirect relationship between concentration and market power
- Interpretation problem
- Link between concentration and welfare is uncertain

For instance, we know that there is a direct relationship between concentration and market power. In particular, in the Cournot model, we have:

$$L = \frac{H}{\varepsilon}$$

However, we can also consider a indirect relationship between concentration and market power.

Simultaneity problem

The indirect relationship between concentration and market power.

- Let $\Pi(p)$ the total profit of the industry where the price p is the result of a collusion. We assume that $\Pi(p)$ increases with p.
- F fixed entry cost
- In equilibrium with free entry, how many firms enter the market? $\rightarrow$ $N = \Pi(p)/F$ firms enter
- An exogenous impact makes an increases of p
- How market power evolves? $\rightarrow$ it increases (prices increase)
- How concentration evolves? $\rightarrow$ It decreases (number of entrants increase).

In this example, we have a **negative** relationship between concentration and market power (when prices increase).

Interpretation of the link between concentration and market power

If a link between concentration and market power was found, we would have had an issue of interpretation:

- Collusion hypothesis (the one of SCP paradigm): a higher degree of concentration implies more collusion between firms
- vs Efficiency hypothesis (Chicago school): starting from a symmetric situation, if a firm reduces its marginal cost, concentration and market power both increase (example: cost reduction in Bertrand competition).

Uncertain link between concentration and welfare

In a symmetric oligopoly, the welfare is:

- Independent of the number of firms under Bertrand competition
- Increasing with the number of firms under Cournot competition

In an asymmetric oligopoly, no clear-cut general relationship in Bertrand or in Cournot.

Control of concentrations

Concentration operations (mergers, ...) should be notified when the concerned firms exceed a specific size.

- In France: Combined worldwide turnover of €150 M, at list two parties each have turnover in France of €50 M, European thresholds not reached
- In Europe (EC): each of at least two of the undertakings concerned has EU-wide turnover of more than €250 million; and there is no EU dimension if each of the undertakings concerned achieved more than two-thirds of its EU-wide turnover in one and the same Member State.

Notification is mandatory. Omission is sanctioned

Control of concentrations is also applied to:

- Equity acquisitions
- Alliances
- Joint ventures

Control of concentrations

Procedure (the case of the EC) :

- Phase I (4 to 6 weeks in Europe): the EC decides if the operation is concerned with the regulation
- Phase II (maximum 4 months): extensive investigation if necessary
- Following phase II: prohibition, clear the deal without conditions or with conditions

Equivalent system in France (phase I / phase II).

Control of concentrations

Principle : Should be authorized only concentrations which...

- France: does not harm free competition (Lignes directrices 2005)
- European Commission: does not significantly hinder effective competition, especially by creating or strengthening a dominant position (Lignes directrices 2004).
- UK: does not reduce significantly competition ("Substantial lessening of competition test", OFT mergers substantive assessment guidance)
- USA: is not likely to substantially lessen competition ("SLC test"); do not create or enhance market power [that is] the ability to profitably maintain prices above competitive level for a significant amount of time

Control of concentrations

Evaluation grid:

- Definition of relevant market
- Positions of the parties and impact of the concentration
  - Market share (in the relevant market)
  - Concentration indexes (HHI)
- Competitive environment
  - Current competitors: number, size, market share, financial resource, vertical integration, privileged access to certain inputs
  - Future and potential competitors: barriers to entry - investments, ownership rights, regulation, etc.
  - Concentration indexes (HHI)
- Consumers: (countervailing) buyer power
- Efficiency gains

Take-Aways (1)

- Market power is the ability of a firm to raise its price over marginal cost.
- From an economic point of view, a market is defined as a group of substitutable products in terms of supply and demand.
- Competition authorities use a group of evidence to define the relevant market: the SSNIP test, transportation costs, price correlation, nature of the need satisfied.
- Different measures of concentration (Herfindhal index, Cm index) and firm's market power (margin ratio, Lerner index) exist, once the relevant market is defined.

Take-Aways (2)

- The structural approach considers that the performance of a firm is determined by the characteristics of the market. Practitioners based their reasoning on the Structure-Conduct-Performance model (SCP paradigm) during a couple of decades.

- The interpretation of the link between concentration and market power is complex. A strong concentration can result from efficiency (Chicago school) or collusion between firms.