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Lecture 21

Market structure

Industrial Economics

Market structure

- Why are some industries ***more concentrated*** than others?
  - Does concentration affect the ***intensity*** of competition?
  - Does technology affect the ***intensity*** of competition?
- Today, competition occurs in ***two levels***:
  national and ***international***
- How economic integration and concentration affects ***competition*** in ***each level***?
- What is the role of ***policies*** that influence the level of concentration?
  for instance, the ***merger*** policy

Structure – conduct – performance

- Concentration ***increases*** profitability in an industry
  because it facilitates ***market power*** or ***collusion***
- Market structure ***interacts*** with firm conduct
  intensity of competition, advertising, R&D
- High profits have to be sustained through ***barriers to entry***
  economies of scale, differentiation, advertisement, vertical integration

Demsetz critique

- Demsetz ***criticized*** the belief that "*Concentration increases profitability in an industry because it facilitates market power or collusion*"
- Demsetz argued that: High profitability may be due to ***efficiency differences*** between firms in an industry
- More ***efficient*** firms naturally tend to get ***larger***
  1. That is, ***concentration increases***
  2. And in general, large firms earn ***higher profits***
- But the first ***does not cause*** the second!

Classification of industries

- In his 1991 book "*Sunk costs and market structure*", John Sutton distinguishes ***two kinds*** of industries:
  1. ***Exogenous sunk costs*** industries
     - The only significant sunk costs are the costs of ***setting up*** a plant of MES
     - industry technology ***dictates*** them
  2. ***Endogenous sunk costs*** industries
     - ***Endogenous*** sunk costs exist ***on top*** of exogenous
     - Firms ***choose*** the endogenous sunk costs

Exogenous sunk cost industries

- Competition can be modeled as a ***two-stage game***:
  1. ***Entry*** at an exogenously fixed sunk cost (decision on K)
  2. ***Competition*** in prices or quantities
- This notion is ***not an unusual*** approximation of reality in some industries
  - Firms must operate ***efficiently*** in order to be ***competitive***
  - Often there is ***limited scope*** for ***additional choice variables*** (advertisement, R&D, quality certification etc.)
- This category ***comprises*** by
  - ***Homogeneous*** good industries
  - ***Horizontal product differentiation*** industries

Endogenous sunk cost industries

- Competition can be modeled as a ***three-stage game***:
  1. ***Entry*** at an ***exogenously*** fixed sunk cost
  2. ***Investment*** on advertising or R&D
  3. ***Competition*** in prices or quantities
- Endogenous costs ***become sunk before*** any price decisions are made by the firms
- This category ***comprises*** by
  - ***Vertical*** product differentiation industries
  - Homogeneous good industries with ***cost-reducing innovation***

Long-run & short-run

- The notion that certain costs are ***sunk*** is closely linked to the ***distinction*** between the two periods
  - Entry, advertising, or R&D are ***long-run*** choices
  - Pricing behavior is a ***short-run*** decision
- In the short run, structure ***is given*** and we analyze ***pricing*** behavior
- In the long run, structure is ***to be determined*** and we analyze choices of ***long-run variables***
- We will analyze the two cases ***separately***

Exogenous sunk costs – assumptions

- ***Symmetric*** firms

  each firm operates a ***single plant***
- ***No barriers*** to entry or exit
- Entry requires an ***exogenous*** fixed ***setup cost***, f
- Two-stage game:
  - Firms simultaneously decide about ***entry***
  - Firms simultaneously set ***prices*** or ***quantities***

Stage 2

- We ***solve for the NE***, given the number of firms, N
- ***Denote*** the equilibrium profit of firm i at stage 2:

$$\Pi_i(N, S, t)$$

- N is the ***number of firms*** that have entered at stage 1

$$\partial \Pi_i / \partial N < 0$$

- S is the ***market size***, determined by an exogenous demand

$$\partial \Pi_i / \partial S > 0$$

- t is the ***intensity of price competition*** that depends on exogenous institutional factors

$$\partial \Pi_i / \partial t < 0$$

Stage 1

- N is determined by the free-entry / zero-profit ***condition***

$$\Pi_i(N, S, t) = f$$

  firms ***will not stop*** entering unless the profit they expect to earn at stage 2 ***drops below*** the exogenous entry cost
- Taking ***the total differential*** of this condition, we obtain

$$d\Pi_i = \frac{\partial \Pi_i}{\partial N} dN + \frac{\partial \Pi_i}{\partial S} dS + \frac{\partial \Pi_i}{\partial t} dt = df$$

- ***Solving*** for dN

$$dN^* = \left(d\Pi_i - \frac{\partial \Pi_i}{\partial S} dS - \frac{\partial \Pi_i}{\partial t} dt \right) \Big/ \frac{\partial \Pi_i}{\partial N} = df \Big/ \frac{\partial \Pi_i}{\partial N} \quad (1)$$

  where N^* is the ***long-run equilibrium*** number of firms

Market size

- From (1)

$$\frac{dN^*}{dS} = -\frac{\partial \Pi_i}{\partial S} \Big/ \frac{\partial \Pi_i}{\partial N} > 0$$

S ***increases*** ⇒

⇒ for the given N, Π_i will ***increase*** ⇒

⇒ ***disequilibrium*** $(\Pi_i > f)$ ⇒

⇒ ***more entry*** till Π_i ***falls*** enough to meet f

- S has a ***positive*** effect on N^*

Sunk investment

* From (1)

$$\frac{dN^*}{df} = 1/\frac{\partial \Pi_i}{\partial N} < 0$$

f ***increases*** ⇒

⇒ ***disequilibrium*** $(f > \Pi_i)$ ⇒

⇒ ***less entry*** until Π_i ***rises*** enough to meet f

* f has a ***negative*** effect on N^*

Degree of competition

* From (1)

$$\frac{dN^*}{dt} = -\frac{\partial \Pi_i}{\partial t}\Big/\frac{\partial \Pi_i}{\partial N} < 0,$$

t ***increases*** ⇒

⇒ for the given N, Π_i will ***decrease*** ⇒

⇒ ***disequilibrium*** $(\Pi_i < f)$ ⇒

⇒ ***less entry*** until Π_i rises enough to meet f

* t has a ***negative*** effect on N^*

Competition and concentration

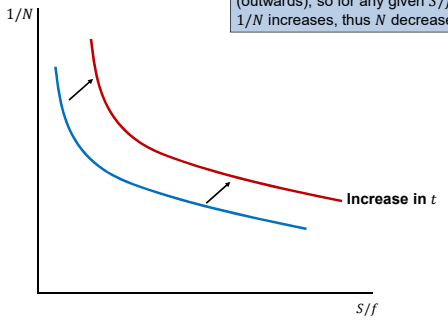
* According to the previous approach, ***intensity of competition*** causes concentration
* But, traditionally, economists regarded concentrated markets as markets where firms ***exploit*** the consumers
  concentration was thought to imply ***low degree*** of competition
* These are not two ***different views*** but two ***different cases***
  - Market exploitation ***assumes*** that incumbent firms can ***deter entry***
  - We have seen cases of ***market contestability*** when entry is open (however not necessarily costless)

The lower bound

* Sutton has ***shown*** that there exists a ***lower bound*** to concentration that depends on t and S/f
* The ***minimum concentration***
  - ***Declines indefinitely*** with market size, S
  - ***Increases indefinitely*** with the exogenous sunk cost, f
  - ***Rises*** with the intensity of competition, t
* The ***actual level*** of concentration can be ***anywhere above*** the bound and may depend on
  - Unobservable features of the industry
  - History
  - Pure chance

The lower bound (graph)

Increase in t, shifts the curve (outwards), so for any given S/f, $1/N$ increases, thus N decreases



Endogenous sunk costs – assumptions

* Competition now can be modeled as a ***3-stage game***:
  1. Firms simultaneously decide if they will ***enter*** at an ***exogenous sunk cost*** f
  2. Each firm chooses to incur an ***endogenous sunk cost*** A_i (advertising, R&D etc.), which ***stimulates*** their own demand only
  3. Firms simultaneously set ***prices*** or ***quantities***

Equilibrium

- Notice that A_i is chosen ***before the competition stage***
  does not affect significantly the MC of the firm
- Optimal entry ***stopping*** conditions
$$\Pi_i(N, S, t, A_i, A_{-i}) - A_i = f$$
- Choice of A_i
$$\frac{\partial \Pi_i(N, S, t, A_i, A_{-i})}{\partial A_i} - 1 = 0$$
- The solution of the above $N \times N$ system defines (N^*, A^*)
  "at equilibrium, an extra cost unit of A_i incurred at stage 2 is equal to Π_i it creates at stage 3"

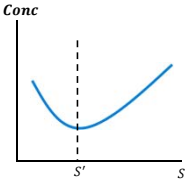
Market size

Consider the ***optimal stopping***: $\Pi_i(S, A_i, N \dots) - A_i = f$ (2)

- When S is low, $\partial \Pi_i / \partial A_i < 1$, thus $A_i = 0$
  in small markets, A_i is ***ineffective,*** so firms invest ***zero*** (or low)
- As S increases, (2) can be satisfied only by ***increasing*** N
  thus, minimum concentration is ***negatively related*** to S
- When S is high, $\partial \Pi_i / \partial A_i > 1$, thus $A_i > 0$
  in large markets firms ***invest*** in A_i because it ***works***
- As S increases, $\partial \Pi_i / \partial A_i$ increases as well and may need N to ***decrease***, too, for (2) to break even
  thus, minimum concentration is ***positively related*** to S

Equilibrium properties

- For a quite generalized setting, the lower bound of concentration exhibits ***two properties***:
  1. ***Non-convergence:*** As the market grows, concentration does not necessarily fall
  2. ***Non-monotonicity:*** There is a non-monotonic relationship between minimum concentration and S
- There is a ***threshold*** size S' such that:
  - Below it, S is ***negatively*** related to concentration
  - Above it, S is ***positively*** related to concentration



The nature of the endogenous cost

- A_i can be ***advertisement*** or ***R&D***
- Advertisement
  - Is an ***informative signal*** about the quality but does not affect the quality per se
  - Improves the ***image*** of the product (user signals class, wealth, status etc.)
  - Can also act as a ***rent seeking*** mechanism
- Research and Development
  - Affects the intrinsic ***quality*** of the product
  - Affects the ***production costs***
- ***Both*** affect the demand but in ***different ways***

Image or quality?

- What do your customers ***care*** for?
  cars, software, electronics ***VS*** clothing, wristwatches, soft-drinks
- How ***effective*** can advertisement be?
  what is the ***net effect*** of advertisement on profit?
- How much ***room*** for improvement is there for the product?
  - R&D intensive industries are ***highly concentrated*** because firms get into expensive ***innovation races*** that require ***size***
  - Non-R&D intensive industries exhibit ***low concentration*** and companies prefer to ***advertise*** and to ***proliferate*** as means of ***deterring entry***
- ***Examples:*** Rolex™ – Tabasco™ sauce

*Empirical research

- Sutton (1991) compares 6 exogenous sunk cost industries to 14 advertising intensive industries
- Sutton (1996) includes R&D intensive industries
  all industries confirm the theoretical expectations
- Findings:
  - As product proliferation increasingly dominates product enhancement, the lower bound to concentration declines
  - Advertising is an endogenous sunk cost, in contrast with the older view of advertising as an exogenous barrier to entry

Policy implications

* The bounds approach has two useful policy implications:
  1. Authorities should be ***less concerned about concentration*** and ***more concerned about the effectiveness of competition*** (collusion, abuse of market power, barriers to entry)
  2. Authorities ***cannot use*** policies that target to impose a market structure below the lower bound, as this is not sustainable

Thank you!

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