MG3212 Strategy

Entry, Exit and Industry Dynamics

Overview of the Session

- Review
  - Entry, Exit and Industry Dynamics
- Learning Activities
  - Assignment–Problem Set: Entry, Exit and Industry Dynamics
- Wrap-up

Review

Entry, Exit and Industry Dynamics

Industry Dynamics

- Creation/death of firms: a fundamental part of market economies

- Entry and exit dynamics change the competitive landscape
  - The entry of new firms increases competition.
  - Competition drives out least efficient firms, who exit.

- Entry and exit dynamics **determine the market structure in equilibrium**
  - So far, market structure was taken as given.
  - Factors that determine the intensity of rivalry can also affect the willingness to enter/exit an industry.
  - We will derive insights relating to market size and market concentration.

Industry Dynamics

- **Empirical evidence:**
  - Firm turnover is a common feature of markets.
  - Inter-industry variation in concentration.

- **Questions**
  - What determines the incentives of a firm to enter/exit a market?
  - What explains the inter-industry variation in concentration?
    - Link between market size and market structure?

Market Structure–Predictions

- **Questions:**
  - What determines incentives to entry/exit?
  - What explains inter-industry variation in concentration? What is the link between market size and market structure?

- **Market Structure–Predictions:**
  - Ex-post competition crowds out ex-ante competition.
  - “Tougher” competition raises concentration.
  - In exogenous sunk costs industries: larger markets are associated with lower concentration.
  - In endogenous sunk costs industries (advertising and R&D is important), large markets may not induce entry if firms react by increasing the investment necessary for entry.

Strucutral Barriers to Entry

- **Structural barriers to entry can come from:**
  - **Control of essential resources**
  - **Economies of scale and scope**
  - **Marketing advantages of incumbency**

Relevant market

- **Industry definition based on close substitutes**
  - Include products that are close substitutes in the industry ant place outside the industry products that are not close substitutes.
  - Product tents to be close substitute when 3 conditions holds:
    1. They have the same or similar *product performance characteristics,*
    2. They have the same or *similar occasions for use,*
    3. They are sold in the *same geographic market.*

Measures of competitiveness and concentration

- … determining whether the market is competitive or not =>
  - to estimate how attractive the market is likely to be in the near future,
  - how likely it is that antitrust action will be taken,
  - if entry or exit by rivals can be expected.

- **Number of firms**
  - Simplest way to measure the competitiveness of a market
  - In a market with many firms, its is less likely that a single firm will have a significant amount of market power.
  - More firms ≈ low entry barriers
  - More firms ≈ lower market share per firm

Measures of competitiveness and concentration

- **C_n –ratio**
  - The sum of the market shares of the n largest firms.
  - Mostly C_4, C_5, C_8
  - Information about how strong the biggest firms are likely to be.

- **Herfindahl-Hirschman index (HHI)**
  - Takes market shares of all the firms in an industry into account and sums their squares.
  - Information of all firms is considered.
  - Larger firms feature more prominently in the index.
  - We don’t have information about the way and intensity with which these firms compete.

Competitiveness and concentration

- **Why are some industries concentrated?**
- **Do we expect higher concentration to be associated to “less competitive” industries?**

Application: Assignments

Problem Set: Entry, Exit and Industry Dynamics

Questions a, b, c, and d

Review: Any Questions?

Any Questions before we move on?

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Questions a, b, c, and d

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Market Concentration in the Steel Industry

Consider the steel making industry in two different countries: USA and Spain. Firms in the steel industry sell homogeneous products. High capital investments constitute one of the main requirements to enter the steel market, but investments in R&D and advertising are less relevant.

Suppose that each market has an infinite number of potential entrants. To enter the market, firms have to incur in a sunk cost $F = 100$ to acquire raw materials and set up plants. Firms in the US and the Spanish markets can produce at the same marginal cost $c = 10$, but differ on the market demand: while the US market demand is $Q = 200 - p$, demand is given by $Q = 50 - p$ in Spain.

Steel Making Industry in USA	**Steel Making Industry in Spain**
• Infinite number of potential entrants • F=100 • C=10 • Q=**200**-p	• Infinite number of potential entrants • F=100 • C=10 • Q=**50**-p

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Questions

Effects on the equilibrium number of firm of changes in technology, demand and regulation

Comparison USA vs. Spain

a. *How many firms will enter in the US and in the Spanish market? What is the Herfindahl-Hirschman Index (HHI) in each market? Is the steel market more concentrated in the USA or in Spain?*

Better technology in Spain

b. *Now assume that Spanish firms can increase productivity by incorporating the latest technology into steel production. This advantage combined with lower wage rates allow them to reduce marginal costs from* 10 *to* 2*. What is the effect on the equilibrium number of firms in the Spanish market?*

Demand reduction in USA

c. *Now assume that the increased use of steel substitutes such as plastic and aluminium have reduced the US need for steel. In particular the US demand has fallen from* $Q = 200 - p$ *to* $Q = 100 - p$*. What is the effect on market concentration?*

New Legislation → F increases in USA

d. *Now consider the original set up for the US market, but suppose there is a new decarbonisation regulation that makes entry more costly. In particular, due to increased concerns in climate change, the United States Congress has passed a law to reduce greenhouse gas emissions and promote environmental friendly technologies. This new regulation forces steel firms to pay a fixed tax–independent of demand and production–that raises their entry cost by* 60*. What is the change in the number of firms in the US steel market?*

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Question a

a. *How many firms will enter in the US and in the Spanish market? What is the Herfindahl-Hirschman Index (HHI) in each market? Is the steel market more concentrated in the USA or in Spain?*

Solutions

- Reminder:
  - **Number of firms in equilibrium** when **many firms compete a la Cournot** with homogeneous goods after entry:

$$n^* = \frac{a-c}{\sqrt{F}} - 1$$

n* increases with higher demand, lower marginal costs and lower sunk costs.

  - **HHI index** is calculated by squaring the market share of each competitor in the market and then summing the resulting numbers

$$HHI = \sum_{i=1}^{n} s_i^2$$

Lower HHI → more competitive (less concentrated)

Assignment–Problem Set: Entry, Exit and Industry Dynamics

	USA	Spain
Number of firms in equilibrium	$n^* = \frac{200-10}{\sqrt{100}} - 1 = 18\ firms$	$n^* = \frac{50-10}{\sqrt{100}} - 1 = 3\ firms.$
HHI Index	$HHI_{USA} = \sum_{i=1}^{n} s_i^2 = \sum_{i=1}^{18} \left(\frac{1}{18}\right)^2 = \frac{1}{18} = 0.055$	$HHI_{Spain} = \sum_{i=1}^{n} s_i^2 = \sum_{i=1}^{3} \left(\frac{1}{3}\right)^2 = \frac{1}{3} = 0.33$

Homogeneous goods

Homogeneous goods

- Based on HHI, US steel market is more competitive (less concentrated) than the Spanish steel market

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Questions b, c

b. *Now assume that Spanish firms can increase productivity by incorporating the latest technology into steel production. This advantage combined with lower wage rates allow them to reduce marginal costs from* 10 *to* 2*. What is the effect on the equilibrium number of firms in the Spanish market?*

c. *Now assume that the increased use of steel substitutes such as plastic and aluminium have reduced the US need for steel. In particular the US demand has fallen from* $Q = 200 - p$ *to* $Q = 100 - p$*. What is the effect on market concentration?*

Solutions

- Lower Marginal costs in Spain (other things equal) → raise the equilibrium number of firms in Spain

$$n^* = \frac{50 - 10}{\sqrt{100}} - 1 = 3\ firms. \xrightarrow[\text{Lower marginal costs from } c = 10 \text{ to } c = 2]{\text{New technology that increases productivity}} n^* = \frac{50 - 2}{\sqrt{100}} - 1 = 4\ firms.$$

- Reduced demand → the number of firms will drastically and the US steel market will be less fragmented

$$n^* = \frac{200 - 10}{\sqrt{100}} - 1 = 18\ firms \xrightarrow[\text{Reduced demand from Q=200-p to Q=100-p}]{\text{Increased number of substitutes}} n^* = \frac{100 - 10}{\sqrt{100}} - 1 = 8\ firms.$$

Assignment–Problem Set: Entry, Exit and Industry Dynamics

Question d

d. *Now consider the original set up for the US market, but suppose there is a new decarbonisation regulation that makes entry more costly. In particular, due to increased concerns in climate change, the United States Congress has passed a law to reduce greenhouse gas emissions and promote environmental friendly technologies. This new regulation forces steel firms to pay a fixed tax–independent of demand and production–that raises their entry cost by* 60*. What is the change in the number of firms in the US steel market?*

Solutions

- The **new legislation** is affecting the US steel industry by raising the **sunk costs from 100 to 160.**
- As n* decreases with higher F, there will be less firms (market less fragmented)

$$n^* = \frac{200-10}{\sqrt{100}} - 1 = 18\ firms \xrightarrow[\text{Reduced demand from } Q=200\text{-}p \text{ to } Q=100\text{-}p]{\text{Increased number of substitutes}} n^* = \frac{200-10}{\sqrt{160}} - 1 = 14\ firms$$

Wrap-up

Wrap up and Main Takeaways

- Firm turnover is a common feature of markets.
- Firms can be deterred from entering because of barriers to entry.
  - *Ex post competition crowds out ex ante competition.*
- “Tougher” competition raises concentration.
- In industries with exogenous sunk costs, larger markets are associated with lower concentration.
- In industries where advertising/R&D is important, large markets may not induce entry if firms react by increasing the investment necessary for entry.

Course Insight #1

- *Reminder*

  To propose a strategy, we need to develop the skills to:

  – Evaluate the opportunities and threats that are present in a firm's environment

    – competitive analysis (game theory; market structure; oligopoly; dynamic collusive pricing; entry, exit and industry dynamics; and industry analysis next week): understand how competitors interact.

- **Main Insight #1 (from competitive analysis):**

  "Ex-post competition crowds out ex-ante competition"