Econ 170: Industrial Organization

Introduction

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Introduction

THE SYLLABUS IS ON THE COURSE WEBSITE - please read it

Textbook and materials

1. Required: Oz Shy, Industrial Organization: Theory and Applications, MIT Press 1995.
2. Supplementary: Pepall, L., D.J. Richards and G. Norman, Industrial Organization: Contemporary Theory & Empirical Applications, Wiley, 2008. (This book may be helpful if you find Shy a bit terse).

Course materials (lecture slides etc) will be posted to the course website as the course progresses. Only topics I cover in class will appear on exams.

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Grading

- 5 Problem sets (5% in total, 1% each, full grade for a bona fide attempt)
- Midterm exam (30% or 0%)
- Final exam (60% or 90%)
- Participation (5%)

The midterm will be redemptive, in the sense that it will count toward 45% of your grade in the event that it increases your final grade. If not, the final will be worth 90%.

Participation is a good citizenship grade - if you are considerate of you classmates in class and think about the economics of a problem before sending an email or asking a question then you will get the full 5%.

Firms

An introduction

In a market economy, firms are in charge of deciding what and how much to produce, and consumers respond to this by shopping for the best alternative.

This course analyzes the behavior of firms.

- What's a firm? What defines the boundary of a firm?
- Given established boundaries, how do firms make production decisions and how do they compete with each other?
- Should government meddle with the operation of firms?

We will focus on questions 2 and 3.

However, before we go to questions 2 and 3, let's do a bird's eyes analysis of question 1.

Course Plan

("Shy" refers to the relevant chapter in Shy)

1. Introduction, the firm
2. Perfect Competition (Shy 4)
3. Monopoly (Shy 5, Shy 13, Shy 14)
    - basics
    - price discrimination
    - bundling
    - durable goods
4. Static oligopoly (Shy 6)
5. Dynamic oligopoly and collusion (Shy 6)
6. Product differentiation (Shy 7)
7. Entry (Shy 8)
8. Network effects (Shy 10)
9. Vertical relationships (Shy 14)
10. Information and advertising (Shy 11, Shy 12)
11. Antitrust and mergers (Shy 1)

Firms

An introduction

"A **firm** is an organization that transforms *inputs* (resources it purchases) into *outputs* (valued products that it sells). It earns the difference between what it receives as revenue from selling its output and what it spends on inputs." (Carlton and Perloff, p.11)

Firms are not as important in all economies:

- US: 84% of national production is done by firms, 12% is by government, 4% by nonprofit institutions (universities and hospitals), private households (less than 0.2%)
- Government share of production is higher in other economies: 37% in Ghana, 40% in Sudan, 90% in Algeria! (1992 figures from the UN)
- But not at all less-developed countries have high government share of production: Bangladesh, Paraguay and Nepal have very small government sectors, with less than 3% of economy.

Firms

Some demographics

- The US economy has about 6 million companies (2007 data).
- Average size of US firms is 20 employees. But the distribution of firm sizes is highly skewed.
- 90% of firms employ fewer than 20 people.
- Only 0.2% of firms have 500 or more employees, but these account for 50% of all employees (2007)
- Top 975 US firms have 10,000 employees or more: they account for 27% of employment and 36% of assets.

Firms

Some demographics

- Share of employment and assets of the largest US firms has fallen since 1970
- Shift from manufacturing to services, in which firms are smaller.

Firms

Entry and exit

- There is considerable amount of "churning" through entry and exit, i.e. at a given instance, there are a lot of young firms.
- Despite entry, the four largest firms in an industry stay in that group on average for over 10 years.
- Half of all entrants fail within 5 years of entry.
- Patterns across Europe
  - Firms are somewhat smaller in Europe than in US
  - Countries with smaller markets have less dispersed size distributions

Figure: Firm Size

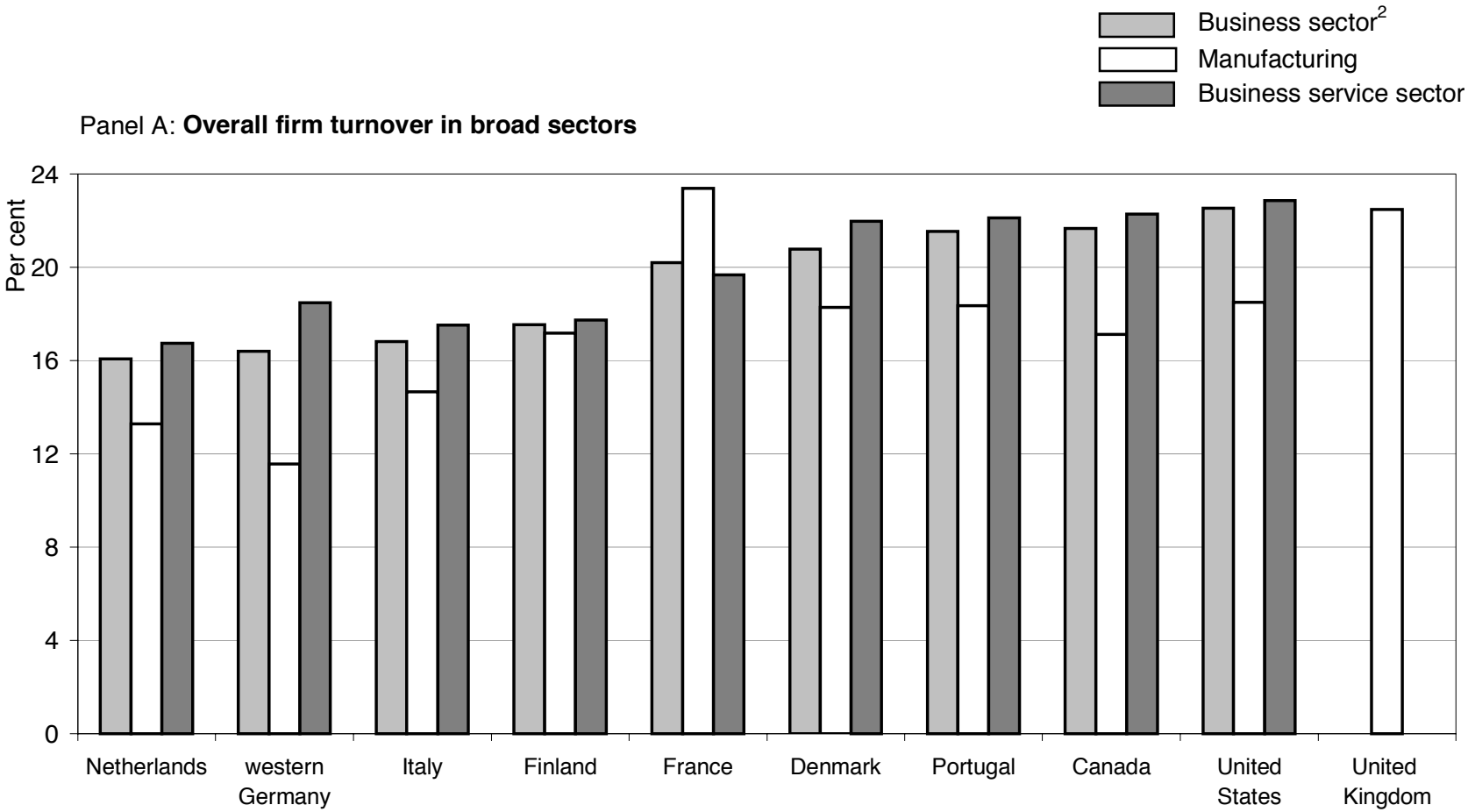
Table 1. **Small firms across broad sectors and countries, 1989-94**
(firms with fewer than 20 employees as a percentage of total)

	Firms				Employment[1]			
	Total economy	Non-agricultural business sector[2]	Manufacturing	Business services	Total economy	Non-agricultural business sector[1]	Manufacturing	Business services
Unites States	86.7	86.5	69.9	87.9	16.6	17.3	5.8	20.6
western Germany	87.9	87.1	77.9	90.2	23.6	23.6	11.3	33.8
France	78.6	78.8	73.6	78.8	13.9	14	17.0	12.1
Italy	93.1	93.0	87.5	96.5	34.4	38.1	30.3	46.3
United Kingdom	..	..	74.9	..	..	..	8.3	..
Denmark	90.0	88.1	74.0	90.8	30.2	30.2	16.1	33.4
Finland	92.6	92.6	84.8	94.5	25.8	25.8	13.0	33.0
Netherlands	95.8	96.0	86.7	96.8	31.2	34.2	16.9	41.9
Portugal	86.3	85.9	70.5	92.8	27.7	26.9	15.7	39.8

1. Share of total employment in firms with fewer than 20 employees.
2. This aggregate excludes agriculture (ISIC rev3: 1-5) and community services (ISIC rev3: 75-99).

Figure: Firm Turnover = Entry Rate + Exit Rate

Figure 2. **Turnover rates in OECD countries, 1989-94**
(entry and exit rates, annual average)[1]



Organizational taxonomy of firms

By objective:

- Profit-maximization
- Non-profit

By ownership structure:

- Sole proprietorship (72% of firms, 4% of sales) (2006 data)
- Partnership (9.5% of firms, 13% of sales)
- Corporation (18.5% of firms, 83% of sales)
- Examples?

Organizational taxonomy of firms

The Corporation

- A corporation raises money by selling stock
- Shareholders elect a board of directors
- Board of directors hire and fire managers
- Shareholders get paid share of profits (dividends), or they can transfer their ownership rights by selling their shares
- Shareholders are paid after debt holders

Advantage of corporation structure: The firm can raise money from shareholders, not just its own partners. Because more people can invest, it's easier to raise money/capital, and easier to grow.

Disadvantage of corporations: separation of ownership from control. If the managers run the firm and if managers are not owners of the firm, what do the managers maximize?

Organizational taxonomy of firms

Who pays the debts?

- Unlimited vs. limited liability
- Sole proprietorship: often unlimited liability. Corporation: limited liability. Partnership: can be either.
- Advantage of limited liability: partners/shareholders are more likely to invest in the firm because they bear less risk.
- Banks in 19th century Scotland. Limited liability banks in Edinburgh grew much larger than unlimited liability banks, and failed much less often.
- Disadvantage of limited liability: shareholders too willing to allow managers to take risks?

How do firms grow?

- Horizontal expansion
  - Produce more using own plants or build new plants
  - Buy up your competitors' plants (horizontal merger)
- Vertical expansion
  - Produce your inputs (McDonalds' potato farms in Turkey)
  - Buy your supplier (GM bought its auto-body maker in 1926)
- Conglomerates
  - Firms in unrelated businesses combine

Why do firms merge?

1. Reduce competition, increase profit
2. Economies of scale
3. Economies of scope
4. Reduce transaction costs
5. Install better management
6. Get rid of cost-increasing "legacy" contracts
7. Game the tax code: Firm A has $100 profit, Firm B has $100 loss. If corporate tax rate is 50%, much tax does the merged firm pay?

Which of these mergers would benefit society as a whole?

BTW - an analysis of the causes and consequences of mergers is still a great research topic.

Mergers

Merger waves

Jovanovic and Rousseau (2002) and (2003)

- 5 merger waves since late 19th century
  - 1890's: monopolization wave (stopped with Sherman Act)
  - 1920's (before the depression): scale-economies wave
  - Late 1960's: conglomerate wave
  - 1980's: "refocusing" wave
  - Late 1990's: "globalization" wave
- Merger waves coincide with booms in stock market
- Merger waves correspond to times of high dispersion of "capital efficiency"
- (Most) Merger waves also correspond to times of technological breakthroughs. Many industries experience a "goldrush" at the start and later "shakeouts," but some new technologies (electricity, IT) affect many industries at the same time and change the way business is done.

Mergers

Merger waves

Figure: Mergers as component of stock market capital reallocation

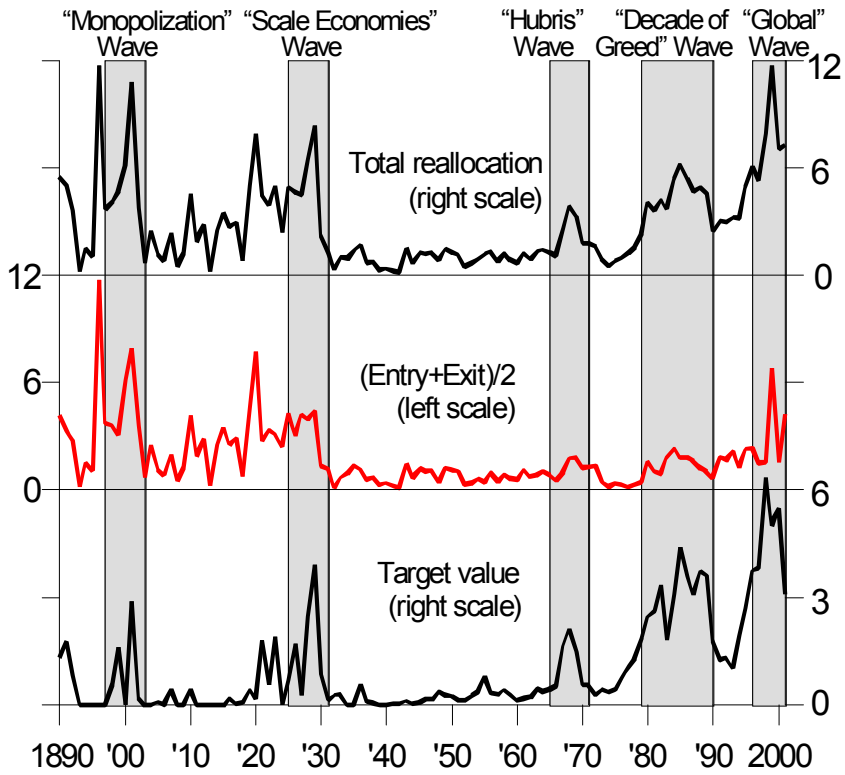


Figure 1: Reallocated capital and components as percentages of stock market value, with merger waves shaded, 1890-2001.

What is a firm?

Firm boundaries

When do you produce something inside the firm as opposed to buying it?

- General intuition: Conducting a transaction outside the firm exposes the firm to opportunistic behavior by the suppliers.
- Example: Hold-up problem. If supplier is in monopoly position, he will have bargaining power and may raise prices.
- Absorbing the supplier into the firm curbs opportunistic behavior.

What is a firm?

Firm boundaries

Other limits of contracting *across* firm boundaries:

- One can try to prevent "opportunistic behavior" by writing (court-enforceable) contracts with suppliers
- But the cost of writing a contract rises with complexity of the task
- The key tradeoff is contracting costs versus opportunistic behavior.
- Simple, well specified tasks are often conducted outside the firm in markets
- Complex, less well specified tasks are done within the firm.
- Pol Antras (2003): Auto manufacturers open up their own plants in other countries. However, European textile manufacturers do not buy cotton farms in Egypt.

What is a firm?

Firm boundaries

- Similarly, why don't all firms vertically integrate?

What is a firm?

Firm boundaries

- There are costs to vertical integration too:
  - Integrated suppliers are run by managers
  - Think of the example of a health insurer merging with a hospital.
  - As firm size and scope increases, this becomes harder to manage.
- There are also explicit transaction costs to vertical mergers: lawyer and investment banker fees, vertical constraints.

What is a firm?

Firm boundaries

Sometimes, integration is not needed to provide incentives.

- Reputation and long term relationships can also help mitigate opportunistic behavior.
- Japanese vs. US auto industry in the 1980s
  - Toyota had far fewer suppliers than GM
  - GM used competitive bidding to lower price.
  - Toyota had long-term relationships with suppliers.
  - GM had large inventories for parts. Frequent part quality problems, due to changing supplier.
  - Toyota had small inventories and just-in-time production. Far fewer quality problems.
  - Lesson: sometimes "competitive" incentives do not work as well as "relational" incentives.

What is a firm?

Firm boundaries

Should there be 2 independent firms or 1 firm operating the productive resources below:

- Golf course next to hotel
- Candy manufacturer and sugar plantation
- Power plant using gas turbine and natural gas pipeline
- Health insurer sending enrollees to hospital

Costs: REVISON

Taxonomy

Types of costs:

1. Fixed costs - don't depend on level of output
   - Suppose (in fall 1999) you were start your own Dot-Com. What would be your fixed costs?
   - Which of these fixed costs would be *sunk*, which would be *avoidable*?
2. Variable costs - depend on level of output

Costs

Definitions

1. Total cost: $C(q) = F + VC(q)$
2. Marginal cost: $MC(q) = \frac{dC(q)}{dq}$
3. Average cost $AC(q) = \frac{C(q)}{q}$

Costs

MC and AC

Claim: $MC(q)$ crosses U-shaped $AC(q)$ at minimum average cost level

- Intuition: If AC is rising, the cost of additional output should be larger than the average. Similarly, if AC is declining, cost of additional output should be lower than the average.
- Mathematical proof: Let q^* be the minimum of $AC(q)$.
- Minimum means $\frac{dAC(q^*)}{dq} = 0$
- Now use: $TC(q) = qAC(q)$.
- But: $MC(q) = \frac{dTC(q)}{dq}$
- And: $\frac{dTC(q)}{dq} = AC(q) + q\frac{dAC(q)}{dq}$
- Substitute $q = q^*$.

Costs

Economies of Scale

- Increasing returns to scale (IRS): $AC(q)$ falls with q.
- Constant returns to scale (CRS): $AC(q)$ stays the same with q.
- Decreasing returns to scale (DRS)

Why might AC decline with scale:

- Fixed costs
- Ability to assign workers to more specialized tasks (pin factory)
- Physical laws: ratio of surface area to volume of container

Costs

Economies of Scope

- Many firms produce more than one type of product
- It might be cheaper to produce two products together rather than separately
  - Beef and hide
  - Shared components (software libraries)
- On average, most firms are fairly specialized. 80% of total output is classied to lie within a single industry.
- However, large firms (146 of top 200 manufacturing firms) are much less specialized (operate in 11 different industries on average)

Costs

Scale and Scope economies

- Economies of scale and economies of scope can complement each other
- Bakeries: individual bakeries of multi-plant firms tend to specialize to exploit economies of scale within plant, but are marketed together
- Can economies of scale and economies of scope conflict?