Lecture 1: Introduction

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Course Description

This course will examine various aspects of the behavior of consumers and firms.

We will use economic theory and empirical analysis to study the strategies of firms in differentiated product markets and the behavior of their potential customers.

We will give particular emphasis to empirical applications.

The aim of the course is to prepare students to study specific industries from different angles, while putting into practice the economic and econometric tools learned in their first and second year courses.

Assignments and Grading

Grading

- Midterm (20%),
- Roughly 6 Assignments (30%)
- Presentation (20%),
- Final Exam (30%),

Books(not required)

- Belflamme and Peitz
- Carlton and Perloff
- Church and Ware, Industrial Organization (free on-line version available).

Topics

1. Introduction to Markets
2. Firm Competition
3. Demand Estimation
4. Price Discrimination
5. Advertising
6. Cartels and tacit collusion
7. Mergers and Multiple Product Firms
8. Antitrust
9. Entry and incumbent firms
10. Other topics: asymmetric information, retail, media, social media

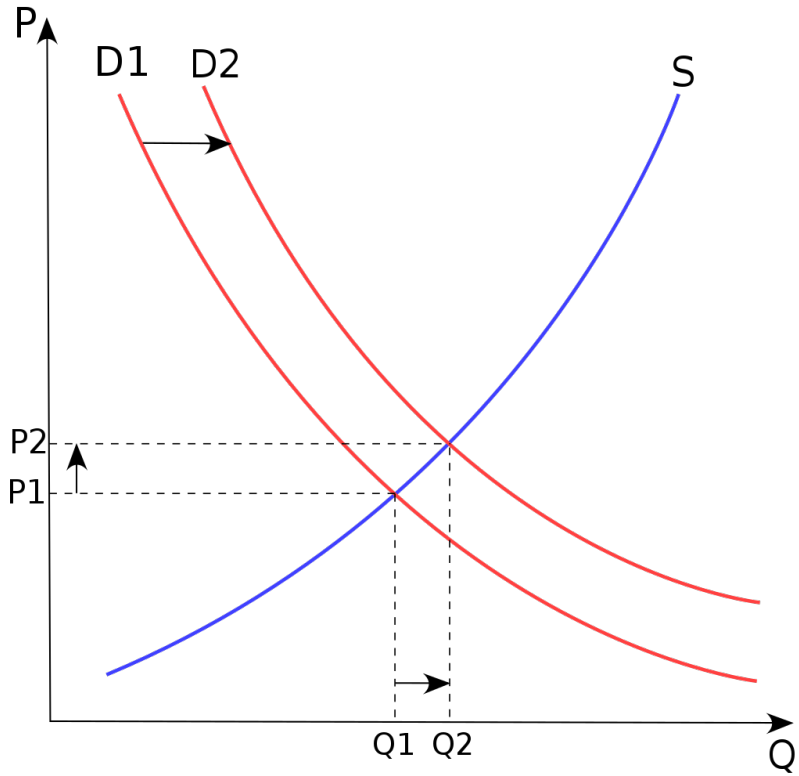
The Presentation

Structure

- Introduction
  - What is the industry? Why is it interesting to study it (for someone other than you)?
  - Main findings.
- Market Structure: which are the main firms, brief history of the firms.
- Industry trends
- Demand: Consumer features, etc.
- Particular feature you want to focus on. See list of course topics. For example: innovation, collusion, mergers, etc.
- Conclusion

Market Equilibrium

Figure: Demand and Supply



Source: Paweł Zdziarski (faxe), Astarot - Own work/ Wikipedia Commons

Market Equilibrium

- Changes in either or both curves affect market equilibrium
- Important to know which!
- What factors change demand? Supply?
- In what markets there is supply and demand, but no prices?

What is industrial organization?

Industrial organization is about the structure of industries in the economy and the behavior of firms and individuals in these industries

- Industrial organization: study of markets and market participants
  - Demand: consumers
  - Supply: firms
  - Interaction between consumers and firms: market outcomes (prices, quantities)
- Departures from perfect competition
  - Strategic behavior
  - Scale economies
  - Transaction costs
  - Information frictions
- Impact on firms' profits and consumers' welfare

Markets

- "Any structure that allows buyers and sellers to exchange any type of goods, services and information." (Wikipedia)
- A structure that allows the interaction of firms as sellers, and consumers or other economic agents as buyers.
- The result of a market: allocation
  - Affected by market power.
  - Can be used for normative analysis.
- Need to assume how market operate.
- Look at the following examples: how are prices/quantities determined?

Market: Example

Figure: Ladies Market, Hong Kong

Source: Fraser Hall/Getty Images

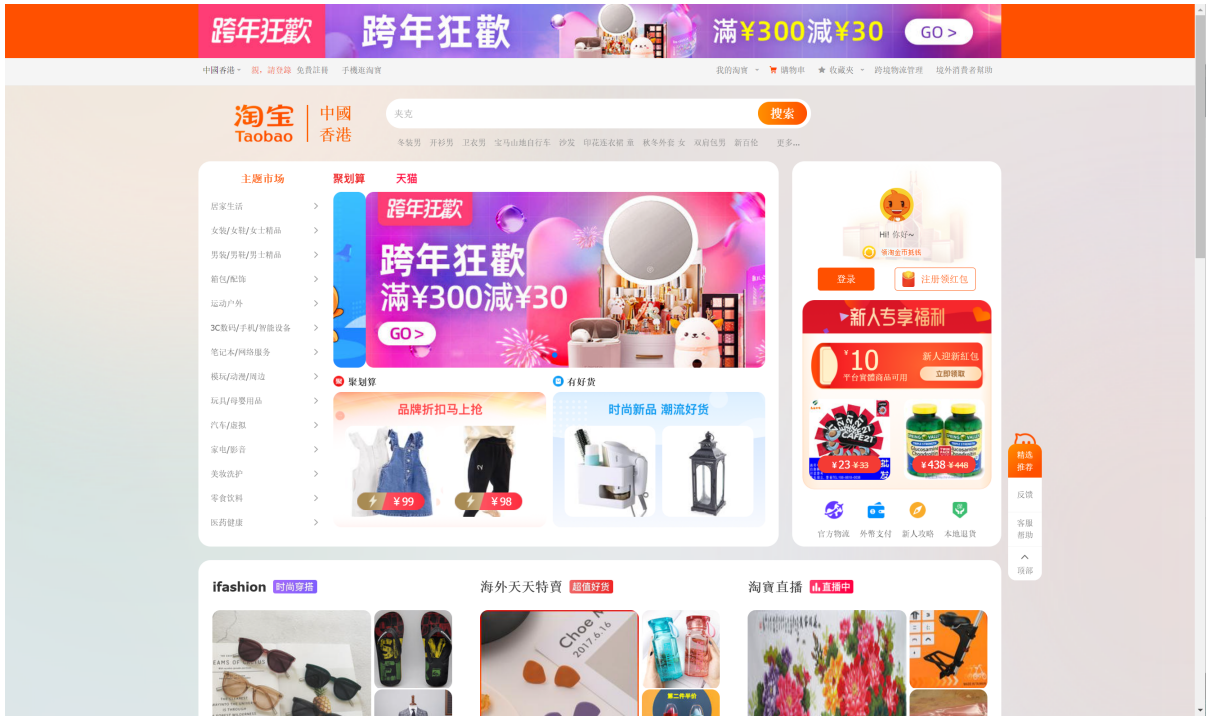
Market: Example

Figure: Times Square, Hong Kong

Source: Photo by Adam Nowek

Market: Example

Figure: Online Market



Source: Taobao.com

Demand

- Who is a consumer? Buyer, potential buyer?
- Willingness to pay
- How can we trace demand curve? Surveys vs. actual data
- Ultimately, preferences
- Can be quite complicated: heterogeneity, switching costs, search costs, advertising.

Supply: Market Power

- "Power to affect the market"
- Monopolies, duopolies, oligopolies
- Price no longer equals marginal cost: generally, price = cost + markup
- Dynamics: Collusion

Market Power

"Market power: the ability to raise prices above the perfectly competitive level."

- Wheat producer
- Dell
- Facebook

The objective of a firm

- Most firms are for-profit firms:
  - They exist to make money. Unless we state otherwise, when we refer to a firm we mean a for-profit firm and not a firm that exists for charitable or other nonprofit reasons.
  - The manager must sell the optimal amount of output, and the firm engages in efficient production: No more output could be produced with existing technology, given the quantity of inputs used.

Ownership and Control

- Sole proprietorship(single owner)
- Partnership(multiple owners)
- Corporation

Case: Conflicts of Interest between Managers and Shareholders

- During the stock market decline, 2002
- Enron: natural gas pipeline company transformed into energy-trading company.
- Deregulation of energy market, Enron stock price grew drastically
- Scandal: executives setup partnerships company and did Business with Enron.
- The firm disavowed its past four years of audited financial statements.
- Enron declared bankruptcy, and litigation followed.

Mergers and Acquisitions

A firm may increase its size by expanding through investment, or by means of a merger

- Vertical merger: A firm combines with its supplier.
- Horizontal merger: Firms that compete within the same market combine
- Conglomerate merger: Firms in unrelated lines of businesses combine

Reasons for merger

- Mergers may Increase efficiency
- May reduce efficiency

Firms' Cost

- Opportunity cost: economic costs v.s. accounting cost.
- Fixed per period cost
  - fixed costs affect the profit level of the firm but do not affect, e.g., pricing decisions because the latter are guided by changes at the margin.
- Sunk cost
  - often cannot be fully recovered when reversing the decision.
  - important to explain the formation of imperfectly competitive markets
- Variable cost
- Average cost(AC)
- Average variable cost(AVC)
- Average fixed cost(AFC)

Economies of Scale and Scope

Economies of Scale A firm's average costs may remain constant, rise, or fall as its output expands.
Reasons firm manufactures several products in one plant, the length of the production run could increase as output expand

- economies of scale: average cost falls as output increases.
- constant returns to scale: if average costs do not vary with output.
- diseconomies of scale: average cost rises with output

Economies of Scope

- Cheaper to produce two products together rather than separately, there is an economicy of scope
- Eg. a steer produces beef and hide. Although it is possible to

Consumers

- Consumers are rational decision makers.
- Consumers have forward looking behaviors. (Durable Goods)
- Consumers face uncertainties.(Advertisement, Asymmetric Information)

Perfect Competition

- Free entry/exit is deterministic factor
- Welfare is maxized under perfect competition
- The desirability of perfect competition is reduced in the presence of externalities such as pollution.
- Even if some of the necessary conditions for perfect competition do not hold, markets can come close to achieving the desirable properties of perfect competition.

Perfect Compeititive Paradigm

- Homogeneous Perfectly Divisible Output.
- Perfect Information.
- No Transaction Costs.
- Firms are price takers,
  - Only make sense if there is a large number of firms on the market.
  - Firms think they can sell any quantity at the given price.
- No Externalities.
- A perfectly competitive firm produces at marginal cost equal to the market price.

The monopoly pricing

- A firm can face downward sloping curve
- Monopoly Problem

$$\max_q \pi(q) = qP(q) - C(q),$$

- The first order condition

$$\underbrace{\frac{P(q) - C'(q)}{P(q)}}_{\text{markup or Lerner index}} = \underbrace{\frac{1}{\eta}}_{\text{inverse elasticity of demand}}.$$

Monopoly Pricing with Multiple Products

- Produce two products, the profit is

$$\max_{p_1,p_2} \pi = p_1 Q_1(p_1, p_2) + p_2 Q_2(p_1, p_2) - C(Q_1(p_1, p_2), Q_2(p_1, p_2)).$$

- First order condition

$$Q_i + p_i \frac{\partial Q_i}{\partial p_i} + p_j \frac{\partial Q_j}{\partial p_i} = \frac{\partial C}{\partial q_i}\frac{\partial Q_i}{\partial p_i} + \frac{\partial C}{\partial q_j}\frac{\partial Q_j}{\partial p_i}.$$

- multiproduct monopolist will depart from the single-product monopoly-pricing formula, because he will take into account the relationships between the demands and/or the costs of the two products.

Linked demand, unlinked cost

- Assume the costs can be separated $C(q_1, q_2) = C_1(q_1) + C_2(q_2)$.
- Then the pricing equation

$$(p_i - C_i') \frac{\partial Q_i}{\partial p_i} = -Q_i - (p_j - C_j') \frac{\partial Q_j}{\partial p_i}.$$

- The Lerner index is then

$$L_i \equiv \frac{p_i - C_i'}{p_i} = \frac{1}{\eta_i} + \frac{p_j - C_j'}{p_i} \frac{\partial Q_j / \partial p_i}{-\partial Q_i / \partial p_i}.$$

  - If substitute, Lerner index is larger than the inverse elasticity of demand.
  - If complements, Lerner index is smaller than the inverse elasticity of demand.

Linked costs, unlinked demand

- One potential link between the costs come from economies of scope. $\partial^2 C(q_1, q_2)/\partial q_1 \partial q_2 < 0$.

$$L_i = \frac{p_i - C_i'\left(q_i, q_j\right)}{p_i} = \frac{1}{\eta_i}.$$

- The Lerner index is
- In the presence of economies of scope, the multiproduct monopolist has an incentive to set lower prices than separate firms

Dominant Firm

- Monopoly model pricing formula states that markup is determined by demand side characteristics.

Case 2.1 The market for generics[10]

After Merck's patent for the cholesterol-lowering drug Zocor expired, two generics producers, Israel-based Teva and India-based Ranbaxy, obtained a 180-day exclusivity on the generics market. (Another company entered into an agreement with Merck to sell an authorized generic version of Zocor). Merck responded to the entry of generics by drastically cutting its price.[f] Generics producers can be expected to compete head-on with each other (thus forming a competitive fringe) whereas the former patent holder offers a differentiated, since branded product that is established in the market. Typically this allows the former patent holder to charge much higher prices than generic producers; it may even increase its price as a response to patent expiry.

Dominant Firm

The monopoly model states that mark up only is determined by the demand side characteristics. Dominant firm model(Hotelling model):

- $i = 1, 2$, two types of products located at the extreme locations of the $[0,1]$ interval.
- Consumer location x uniformly distributed, with mass M.
- Consumer x maximize utility by $\max_{i=1,2}\{r - \tau|l_i - x| - p_i\}$, τ the substitutability of product 1.
- Indifferent consumer $\hat{x}$: $r - \tau\hat{x} - p_1 = r - \tau(1 - \hat{x}) - p_2$, then $\hat{x} = \frac{1}{2} + \frac{p_2 - p_1}{2\tau}$.
- Demand of firm 1 is $Q_i(p_i, p_j) = M\left(\frac{1}{2} + \frac{p_j - p_i}{2\tau}\right)$

Dominant Firm: Constant Marginal Cost

Suppose the firm have constant marginal cost c. Then the profit-maximization problem of firm 1 is

- $\max_{p_1} p_1 Q_1(p_1, c) - C(Q_1)$.
- $p_1 = c + \frac{\tau}{2}$.
- Demand for firm 1 is $M/4$ in equilibrium and its profit is $(M\tau)/8$.

Dominant Firm: Increasing Marginal Cost

Suppose the firms have increasing marginal cost $C_i(q) = cq_i^2/2$.

- 'pseudo best response' of the competitive fringe:

$$p_2(p_1) = cM(\frac{1}{2} + \frac{p_1 - p_2}{2\tau}), p_2(p_1) = \frac{cM(\tau + p_1)}{2\tau + cM}.$$

- Firm 1 maximize $p_1 Q_1(p_1, p_2(p_1)) - C_1(Q_1(p_1, p_2(p_1))$.
  $Q_1(p_1, p_2(p_1)) = \frac{M}{2\tau + cM}(\tau + cM - p_1)$.
- The profit-maximization price of firm 1 is

$$p_1 = \frac{2(\tau + cM)^2}{4\tau + 3cM}.$$

- The profit of firm 1 is $\pi_1 = \frac{M(\tau + cM)^2}{2(4\tau + 3cM)}$.

Imperfect Competition

- Oligopoly
  - Compete in price
  - Compete in quantity
- Dominant firm
  - Endogenously determined followers

SSNIP test

To define a market, identify the closest substitutes to the product (or service) that is the focus of the analysis.

- Conceptual framework hypothetical monopolist test.
- The test defines as the relevant market the smallest product group (and geographical area) such that a hypothetical monopolist (or cartel) controlling that product group (in that area) could profitably sustain a Small and Significant Non-transitory Increase in Prices(SSNIP).
- Limit: focus on demand-side substitutability.

Measuring Market Power

- Lerner Index
- m-firm concentration ratio
- HHI (Herfindahl index, or Herfindahl–Hirschman index)

Lerner Index

$$L = \frac{p - c}{p}$$

- Markup
- Prices and cost
- Perfect competition: 0
- Monopoly?
- How do we measure costs?
- Static.

Concentration Ratio

$$I_M = \sum_{i=1}^{m} \alpha_i$$

- α_i is firm i's market share
- Focuses of big firms
- m typically 3 or 4
- In Europe, dominant firm if $\alpha_i > 40\%$ of the relevant market

HHI

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

- α_i is firm i's market share
- Important: Include all firms in the market.
- HHI is measure of dispersion: All firms, but higher weight of bigger ones.
- Monopoly: HHI= 1

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- Monopoly: HHI= 1
- Identical firms: HHI= $1/n$
- Perfect competition: HHI= 0
- Sometimes measured in %
- In the US, market is unconcentrated if the index is below 1000 (or 10%), and as highly concentrated if the index is above 1800 (or 18%).
- In Europe, look at changes.

Table 2.1. *Herfindahl indices in the US manufacturing sector*

Industry Group	1997	2002	Variation
Transportation equipment mfg	797.6	574.7	−229.9
Beverage and tobacco product manufacturing	777.2	709.5	−67.7
Petroleum & coal products mfg	350	543.4	+193.4
Textile product mills	186.2	403	+216.8
Paper mfg	173.3	259.3	+86.0
Leather & allied product mfg	167.2	163.6	−3.6
Computer & electronic product mfg	136.6	135	−1.6
Electrical equipment, appliance, & component mfg	105.9	113.9	+8.0
Apparel mfg	100.6	105.7	+5.1
Primary metal mfg	97.4	149.6	+52.2
Textile mills	94.4	105.6	+11.2
Food mfg	91	118.7	+27.7
Chemical mfg	76.6	99.9	+23.3
Furniture & related product mfg	55.5	57.2	+1.7
Machinery mfg	55.4	71.3	+15.9
Wood product mfg	52.7	48.4	−4.3
Nonmetallic mineral product mfg	52.1	46.7	−5.4
Printing & related support activities	38.4	45.2	+6.8
Plastics & rubber products mfg	30.2	32	+1.8
Fabricated metal product mfg	8.5	10.2	+1.7

Source: US Economic Census Data – Manufacturing sector

Do Increasing Markups Matter? Lessons from Empirical Industrial Organization?

Steven Berry, Martin Gaynor, and Fiona Scott Morton(2019), JEP

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Motivation

Observations:

- Increasing monopoly power in the US and the world economy.
- Need to learn about the consequence of market power and markups.
- Bresnahan (1989), demand cost and pricing conduct.

Assumption: firms maximize profit and have to cover their total costs, the equilibrium price will be determined by price, demand and fixed cost.

Issue with Recent Studies of Market Power

- Early empirical research in industrial organization from the 1950s into the 1970s employed the structure-conduct-performance paradigm to study how the extent of competition affected market outcomes.
- Regression analysis, with explanatory variable is a measure of concentration.
- Criticism(Bresnahan 1989; Schmalensee 1989).
  - hard to measure concentration
  - markets are not observed directly in the data

Does concentration increase mark up?

- Ganapati (2018a): concentration increases are positively correlated to productivity and real output growth.
- Ganapati (2018b) studies the large wholesaling sector of the economy. Ganapati notes that, in 2012, wholesalers accounted for 50 percent of sales to downstream buyers in the US manufactured goods market and that, contrary to prominent examples of large retailers disintermediating wholesalers, the wholesale sector overall was growing in size.

Factors Leading to Rising Markups

- Plausible that some primitives have changed over the decades:
  - cost conditions
  - demand conditions
  - pricing environment
- E.g.
  - Supply side: IT has grown in importance
  - Demand side: network effect

Rising Fixed and Sunk Costs

- Fixed (often sunk) costs at the firm level reflect endogenous choice of product quality (Shaked and Sutton 1982; Sutton 1991).
- Higher spending on information technology.
- E.g.
  - software require large up-front payment.
  - digital intensive industry observe more growth in markup.
- Fixed (or sunk) costs as a kind of residual that explains the observed equilibrium market structure (or pattern of entry and exit; see Bresnahan and Reiss 1990; Berry 1992; Ciliberto and Tamer 2009; Berry, Eizenberg, and Waldfogel 2016).
- Welfare consequences of increasing sunk and fixed costs in an industry are complex.

Network Effects

- Important in many sectors, strongly present in.
- Digital platforms (US Bureau of Economic Analysis 2018)
- A rising importance of network effects can lead to weaker competition and thus higher markups in various ways.
  - Consumer lock-in
  - (potentially) Make fixed costs more importan
  - expansion of information technology, distribution, delivery, and promotion in order to reach a larger number of customers

Growing Monopsony Power

- Concentration of employers is growing in labor markets and that more concentrated employer markets are associated with lower wages (Azar et al. 2018; Naidu, Posner and Weyl 2018; Azar, Marinescu, and Steinbaum 2020).
  - declining cost of labor, typically a variable cost, may have contributed to the trend in markups
- Evidence that the extent of monopsony power in the labor market has grown over the years (Manning 2003).
- Weakened worker bargaining power (Farber et al. 2021)
  - declines in union membership, in the powers available to unions,
  - legal remedies available to individual workers

Increased Rent Seekin

- Increased price discrimination
- Engaging in holdup of a relationship-specific investment or by reneging on agreements that are not sufficiently protected by contract.
  - E.g. pharmaceutical industry CEO Martin Shkreli sharply increased the price of a generic drug in a marketplace where it takes several years for a competitor to be approved by the Food and Drug Administration (Pollack 2015).

Globalization

- Firms with global supply chain
  - lower-cost inputs, achieve economies of scale
  - If gains market share at the expense of domestic rivals, industry markups will rise

Antitrust Enforcement

- Courts in recent decades have been steadily dialing back antitrust enforcement(economic assumptions built in to jurisprudence, practical changes e.g. raising the pleading standards for plaintiffs).
- Decline of antitrust enforcement in recent decades may be a contributor to rising markups.

Concerns

- Vertical restraints.
- Coordinated effects.
- Digital platform.
- Firms exploit intellectual property.
- etc.

References I