Introduction to IO

• Study the functioning of markets.

1 Historical development of IO

2 waves:
1. “Harvard Tradition” (J. Bain (1956, 1959) and E. Mason (1939, 1949)) is more empirical.
   – Structure - Conduct - Performance paradigm.
   – BUT causal relationship or correlation?
   – Descriptive analysis: Case studies, Regressions.
   – BUT limits of empirical analysis.
   – “Chicago Tradition”: need for rigorous theoretical analysis.
2. In 70s, theoretical wave due to different factors
   – Economists were not satisfied with the empirical analysis;
   – New interest for IO.
   – Non cooperative game theory (Nash in 50s).
   – Dynamics and asymmetric information.
2 Definition of IO

- Structure and behavior of firms in imperfectly competitive markets.
- But IO is also concerned with market inefficiency. Imperfect competitive markets are unlikely to maximize social welfare.
- Government intervention: antitrust action, market regulation....
- New theoretical IO relies on old tradition (case studies and stylized facts).

There exists two new waves:

1. A new empirical IO wave (econometric) with structural models (theoretical model + data and empirical analysis to test the model with completely new tools).
2. Experiments in laboratories (new wave in micro and game theory as well).
3 Market definition, Partial equilibrium and Welfare criteria

3.1 Competitive-equilibrium

Sketch of the model (Arrow Debreu):

- economic goods,
- no asymmetric information,
- consumers have preferences over bundles of goods,
- producers (owned by consumers) have to respect a production set,
- all agents are price-takers.

- Consumers maximize their welfare under their budget constraint \( \rightarrow \) the demand function.
- Producers maximize their profit subject to the technological constraint \( \rightarrow \) the supply function.

- A Competitive equilibrium is a set of prices, with associated demands and supplies such that the markets for each good clear (total demand=total
supply).
Two fundamental welfare theorems:
1. A competitive equilibrium is Pareto Optimal.
2. Under convexity assumptions, any Pareto Optimal allocation can be decentralized by a choice of the right prices and an appropriate redistribution of income among consumers.

⇒ Each good is sold at its marginal cost.

This model does not take into account
• externalities may exist between agents,
• goods can be public in nature,
• consumers can have imperfect information.

Key assumption of this model: agents are price-taker.
• But most markets are served by a small number of firms with non negligible market power.

Our assumptions
A1. Partial equilibrium;
A2. Downward-sloping demand curves;
A3. Consumer surplus.
3.2 Consumers’ Surplus

- What is the demand for a single good?
- Quasi-linear utility function

\[ U(q_0, q_1, \ldots, q_m) = q_0 + \sum_{h=1}^{m} V_h(q_h) \]

where \( q_0 \) is the numeraire. \( V'_h(q_h) > 0 \) and \( V''_h(q_h) < 0 \).

- The program of the consumer is

\[ \begin{align*}
\text{Max}_{q_0, q_1, \ldots, q_m} & \quad U(q_0, q_1, \ldots, q_m) \\
\text{s.t.} & \quad q_0 + \sum_{h=1}^{m} p_h q_h \leq I
\end{align*} \]

where \( I \) is the income.

- FOC

\[ V'_h(q_h) = p_h \forall h = 1, \ldots, m \]

- Demand decreases with price,
- demand is independent of the other prices and income.

- Consider homogeneous good.
What is the consumer’s surplus?

In discrete:
- many heterogenous consumers
- each buys 0 or 1 unit
- consumer $i$’s willingness to pay is $v_i$
- marginal consumer $v_n$
- $v_1 \geq v_2 \geq \ldots \geq v_n$
- Consumer’s surplus
  $$CS = (v_1 - p^o) + (v_2 - p^o) + \ldots + (v_{n-1} - p^o)$$

In continuous:
- net consumer’s surplus
  $$S^n = \int_{p^o}^{\bar{p}} D(p)dp$$
  where $\bar{p}$ is the lowest price at which there is no demand. In discrete case ($\bar{p} = v_1$).

What happens if the price changes from $p^o$ to $p^1$?

$$\Delta S^n = - \int_{p^o}^{p^1} D(p)dp$$

$$\Delta S^g = - \int_{p^o}^{p^1} D(p)dp + [p^1 D(p^1) - p^o D(p^o)]$$
• What is the **producer surplus?** $PS$ is the profit
  \[ \Pi = p^o q^o - C(q^o) \]
  where $C(q^o) = \int_0^{q^o} MC(q) dq$.

• What is the **total surplus?**
  – Aggregate welfare $TS = CS + PS$.
  – The TS is maximum when $p = p^o$.

• If the price increases, what is the measure of welfare loss?
  – **Deadweight loss:**
    \[ DWL = TS(after) - TS(before). \]
  – A unit tax $t$ for each unit sold
    \[ DWL = \frac{1}{2} t |q^1 - q^0| = \frac{1}{2} t^2 |D'(p^1)| \]

• There exist other measures of the surplus (if more than one good).
  • Compensating variation;
  • Equivalent variation.
3.3 What is a market?

- It involves either a homogeneous good or group of differentiated products that are fairly good substitutes (or complements) for at least one good in the group and have limited interaction with the rest of the economy.

- Examples: market for cars, for luxurious cars, for used cars....... Market for soft drink (Ginger Ale, Lemonade....), market for Cola (Coke and Pepsi).

3.4 Major observations

Why competitive market does not explain everything?
1. Concentration
2. Product characteristics
3. Costly activities
4. Research and development
The Theory of the firm

What is a firm?

How does a firm behave?

• A firm should transform efficiently inputs into outputs.
• If the objective of the firm is to maximize its profit.
• BUT manager and owners can have different objectives (principal-agent model).
• Horizontal and vertical aspects of a firm’s size.
  – Horizontal: refers to the scale (or scope) of production.
  – Vertical: reflects the extend to which goods are produced in-house.
• What is the internal organization of a firm?
• Is it better to produce everything indoor, or to buy certain products to other firms?

What is a firm?

What determines the size of a firm?

• Efficiency reason for integration or disintegration.
3.5 Exercise of monopoly power

• Why integration? to legally have a monopoly power on the product market.

• A firm is vertically integrated if it participates in more than one successive stage of the production of goods.

• Some practices are banned by antitrust laws:
  a. price discrimination (to avoid arbitrage)
  b. intermediate price controls (to generate unobservable transaction)

3.6 Static Synergy

• Why will a firm decide to gather activities indoor? (in a static contract)

• To exploit economies of scale or of scope.

• Single product cost function:

\[ C(q) = F + vc(q) \]

where \( F \) is the fixed cost and \( vc(q) \) the variable cost.
Marginal cost:

$$MC(q) = \frac{dC(q)}{dq} = \frac{dv_c(q)}{dq}$$

and average cost

$$AC(q) = \frac{F}{q} + \frac{vc(q)}{q} = AFC(q) + AVC(q).$$

Graphic

- When $MC < AC$ **economies of scale**,  
- when $MC > AC$ **diseconomies of scale**,  
- when $MC = AC$, **constant return to scale**.

- Multiproduct: **economies of scope** if $c(q_1, 0) + c(0, q_2) > c(q_1, q_2)$.

- Examples of natural monopolies  
  – long distance telecommunication in US (AT&T) in 1950s,
– airline services for some cities,
– electricity distribution,
– railroad companies produces passenger travel + freight transport.

• Economies of scale encourage integration. But firms can contract instead of doing everything indoor.

3.7 Long run relationship

• Vertical relationship between a seller and a buyer.
  – LR relationships are often associated to switching costs or specific investment.
  – Bilateral monopoly pricing and the ex post volume of trade.
  – Specific Investment and the hold-up problem.

• LR relationships suggests that firms should write long and detailed contracts when it is possible and not too costly...

3.8 Incomplete contract

• In reality contract are incomplete: it is impossible to
specify any contingency (too costly).

- Vertical integration is more likely (relative to a long-term contract) when transaction costs are high.

3.9 The profit-Maximization Hypothesis

- Objective of firms: maximize their payoff.
- But the manager may have other objectives
  – maximize their firm size
  – minimize the working time...
- Ownership and control do not have the same objectives.
- Incentive theory: principal-agent model.