Industrial organization is one of the main fields in economics. It is about the theories of firms and markets, about how firms behave and interact in the marketplace, and about the implications of such behavior and interactions on economic efficiency and on public policies.

Before 1970s, IO predominantly follows the paradigm of “structure-conduct-performance”, or often called the Harvard tradition, after Professor Joe Bain. The basic idea is that market structure determines how firms behave, which in turn determines the performance of the market. The research methodology is mainly empirical: running regressions on variables of market structures to see their effects on variables such as profitability of the industry, etc. The problem is that it does not have a convincing theoretical foundation. The higher profitability, for instance, could be due to that firms are more efficient.

The new industrial organization started in perhaps middle 1970s, together with the development of game theory. The development of game theory provided a tool for economists to analyze strategic interactions among firms. This course is mostly about this theoretical development.
1. THE THEORY OF THE FIRM

Neoclassical economics has treated the firm as a basic unit of analysis. But there has long been an uneasiness for this treatment. A firm usually consists of a set of individuals who may have different interests. Ronald Coase was the first one to pose the question about the nature of the firm. According to Coase, the fact that transactions are conducted within a firm instead of through market contracts suggests that there are advantages to use firms. There are transaction costs to use either the firm or the market in organizing economic activities, and the choice of organization forms will tend to minimize such transaction costs.

Coase’s argument is extended by Oliver Williamson, who shed light on what determine transaction costs. He made especially clear that asset specificity and opportunism are two important elements in deciding the choice of organization forms.

The Property-Rights Approach

The more formal modeling of the firm starts perhaps with Grossman and Hart, who provide a theory of why ownership patterns matter and how ownership should be assigned. The starting point of this theory is that contracts are incomplete.

Example 1. A buyer and a seller may conduct a trade for a good tomorrow. The value of the good to the buyer is \( v \), and the cost of producing the good is \( c(I) \), where \( I \) is the seller’s investment today. Suppose that \( v \geq c(0) \), \( c'(I) < 0 \), and \( c''(I) > 0 \). Both \( v \) and \( c \) will be known tomorrow to the two parties, and the transaction price will be determined through negotiations. Assume that the price is given by the Nash bargaining solution:

\[
p = \frac{v + c(I)}{2}
\]
so that

\[ p - v = v - c. \]

How much will the seller invest?

\[
\max_I \left\{ \frac{v + c(I)}{2} - c(I) - I \right\},
\]

or

\[
\frac{c'(I^*)}{2} = -1.
\]

On the other hand, the socially efficient level of investment solves

\[
\max_I \left\{ v - c(I) - I \right\},
\]

or

\[
c'(I^o) = -1.
\]

We have

\[ I^* < I^o \]

This is a simple version of the famous result that there is under-investment in the presence of a “hold-up” problem. When it is time for negotiation, the investment is sunk, and the seller cannot fully capture all the cost savings from the investment.

This provides incentives for vertical integration to avoid the hold-up problem.

Some key elements to this story: complete contract not possible, one-shot game, etc. Examples of this sort.

One variation to this story is that there is asymmetric information at the bargaining stage. That can introduce additional inefficiency ex post. A beneficial trade may not be carried out. This may also suggest the need for a firm, since it may be easier to gather information within a firm than across firms.
Example 2. Again consider a possible transaction between a buyer and a seller. Suppose that an improvement to the product can be made tomorrow \((t = 2)\), the cost of making the improvement to the seller is \(c > 0\), and the value of this improvement to the buyer is \(v > c\) with probability \(x\) and 0 with probability \(1 - x\). The buyer can make an investment, \(I = \frac{x^2}{2}\), before \(t = 2\).

First consider the efficient choice of \(x\):

\[
\max\{x(v - c) - \frac{x^2}{2}\}
\]

\[x^o = v - c, \quad I^o = \frac{(v - c)^2}{2}.\]

Next, suppose that whether or not to make the improvement is determined by bargaining at \(t = 2\) without any precommitment. Again assume the bargaining is given by the Nash bargaining solution. Then there will be improvement iff \(v > c\), and each receives \(\frac{(v-c)}{2}\). Thus the buyer’s investment solves

\[
\max_x \left\{x \frac{v - c}{2} - \frac{x^2}{2}\right\}.
\]

That is

\[x^* = \frac{v - c}{2} = \frac{x^o}{2}.\]

This is the under-investment result we have seen earlier.

Next, suppose that the seller has the right to determine whether the improvement is to be made. The threat point in the bargaining in this case is the same as in the unconstrained bargaining, and thus we will again have \(x^*_s = \frac{v-c}{2}\).

Now if the buyer has the right to determine whether the improvement should be made. Without renegotiation, improvement will always be made since this now is the status quo. The buyer’s investment now solves
\[
\max_x \{ xv + (1 - x) \frac{c}{2} - \frac{x^2}{2} \}.
\]

Or

\[
x_b^* = v - \frac{c}{2} > x^o.
\]

So in this case there is over-investment. The intuition is that the buyer’s authority over production means that he does not need to pay \(c\). Because he does not internalize this cost, he overinvests to make production more likely.

This associates ownership to the rights of control. There are both benefits and costs to assign ownership rights. Having ownership (control) rights may motivate a party to invest more, but this could also result in under-investment. The key is that contracts are often incomplete.

The study of the theory of the firm is thus often related to the study of contract theory. Recent Developments in contract theory.

(INsert: The Nash Bargaining Solution:

A two-person bargaining problem consists on a pair \((F, v)\) where \(F\) is a closed convex subset of \(R^2\), \(v = (v_1, v_2)\) is a vector in \(R^2\), and the set

\[
F \cap \{(x_1, x_2) : x_1 \geq v_1 \text{ and } x_2 \geq v_2\}
\]

is nonempty and bounded. Here \(F\) represents the set of feasible payoff allocations or the feasible set, and \(v\) represents the disagreement payoff allocation or the disagreement point.

A solution function is denoted as \(\Phi(F, v)\), which maps from the set of all two-person bargaining problems to \(R^2\).
The Nash bargaining solution:

$$\Phi(F, v) \in \arg \max_{x \in F, x \geq v} (x_1 - v_1)(x_2 - v_2).$$

When two people bargain to divide a dollar, for instance,

$$\max x_1(1 - x_1)$$

$$x_1 = x_2 = \frac{1}{2}.$$

The generalized Nash-bargaining solution:

$$\max_{(x_1, x_2) \in F} (x_1 - v_1)\alpha(x_2 - v_2)\beta$$

for $\alpha > 0$ and $\beta > 0$.

**The Principal-Agent Theory**

Closely-related to the theory of the firm is the principal-agent literature, which focus on how incentives should be designed within a firm. The starting point is that the owner (the principal) and the employees (the agent) of a firm may often have different interests. The employee often has better information about the exact actions she would take and/or the environment she works in. For instance, a manager of a firm usually knows better than the owner about how hard she is working and what are the changes in the market conditions. In the first case, where a principal cannot observe the actions of an agent, the problem is referred to as hidden actions or moral hazard. In the second case, where the agent has superior information about the environment, the problem is usually referred to as hidden information.

The principal-agent problem is part of a more general problem of mechanism design: a principal designs a mechanism that induces agents to take certain actions that are
most favorable to the principal. Some of the areas this approach has found many applications include: the design of optimal selling mechanisms by a monopolist or the government; design of regulation regimes; corporate governance; provision of public goods; design of optimal trade instruments; optimal compensation and labor contracts.

The profit-maximization hypothesis.
Incentive contracts.
Market for corporate control
Board of directors
Corporate governance.