Microeconomics II

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Introduction

Course Web: http://www.eco.uc3m.es/docencia/microii

Classic Microeconomics studies the role of markets in the allocation of scarce resources and concludes that under appropriate conditions:

The exchange of goods and services in competitive markets leads to an efficient allocation of resources: the inputs are used in the most valuable production activities, and the goods are distributed in a way such that there are not further gains to trade. (**First Welfare Theorem)**

A Private Property Economy

An economy is described by a colection

$$[Y_1, ..., Y_m, (u_1, \bar{x}_1, \theta_1), ..., (u_n, \bar{x}_n, \theta_n)].$$

$\triangleright Y_j \subset \mathbb{R}^l$ is the set of feasible production plans for firm $j \in M := \{1, ..., m\}$, l is the number of goods, and for $y_j \in Y_j$, negative (positive) coordinates are inputs (outputs).

$\triangleright u_i : \mathbb{R}^l_+ \rightarrow \mathbb{R}$, describes the preferences of consumer $i \in N := \{1, ..., n\}$.

$\triangleright \bar{x}_i \in \mathbb{R}^l_+$ specifies the initial endowments of consumer $i \in N$.

$\triangleright \theta_i \in [0, 1]^m$ identifies the share of the property of each firm owned by consumer $i \in N$. Hence $\sum_{i \in N} \theta_{ij} = 1$, $\forall j \in M$.

A Competitive Market Economy

Suppose that there are competitive markets for all goods.

Given a price list $p \in \mathbb{R}^l_+$, denote by $y_j(p)$ the demand of inputs and supply of outputs of firm $j \in M$, i.e.,

$$y_j(p) = \arg\max_{y_j \in Y_j} \sum_{k=1}^{l} p_k y_{jk},$$

and by $x_i(p)$ the demand of goods of consumer $i \in N$, i.e.,

$$x_i(p) = \arg\max_{x \in B_i(p)} u_i(x),$$

where

$$B_i(p) = \left\{ x \in \mathbb{R}^l_+ \mid \sum_{k=1}^{l} p_k x_k \leq \sum_{k=1}^{l} p_k \bar{x}_{ik} + \sum_{j \in M} \theta_{ij} \sum_{k=1}^{l} p_k y_{jk}(p) \right\}.$$

Competitive Equilibrium

A competitive equilibrium (CE) is a vector (p^*, x^*, y^*) such that

(1) $y_j^* = y_j(p^*)$, $\forall j \in M$.

(2) $x_i^* = x_i(p^*)$, $\forall i \in N$.

(3) $\sum_{i \in N} (x_{ik}^* - \bar{x}_{ik}) \leq \sum_{j \in M} y_{ik}^*$ holds (with equality if $p_k^* > 0$), $\forall k \in \{1, ..., l\}$.

That is, at prices p^* firms input demands and output supplies (1) and consumers demands (2) are such that markets clear (3).

First Welfare Theorem

A *feasible allocation* is a vector $(x, y) \in \left(\mathbb{R}^l_+\right)^n \times \prod_{j \in M} Y_j$ such that for all $k \in \{1, ..., l\}$,

$$\sum_{i \in N} (x_{ik} - \bar{x}_{ik}) \leq \sum_{j \in M} y_{ik}.$$

A feasible allocation (x, y) is *Pareto optimal* if there is no other feasible allocation (x', y') such that

(P1) $u_i(x'_i) \geq u_i(x_i)\ \forall i \in N$, and

(P2) $\sum_{i \in N} u_i(x'_i) > \sum_{i \in N} u_i(x_i)$.

First Welfare Theorem. Competitive allocations are Pareto optimal.

First Welfare Theorem: Example

Consider an economy in which there are two goods x and y, one firm whose production set is

$$Y = \{ \left(-x, y\right) \in \mathbb{R}_{-} \times \mathbb{R}_{+} \mid y \leq 2\sqrt{x} \right) ,$$

and two consumers with identical preferences, represented by $u(x, y) = xy$, and endowments, $(\bar{x}_i, \bar{y}_i) = (24, 0)$, and with fractions $\theta \in [0, 1]$ and $1 - \theta$ of the firm's property.

Calculate the set of Pareto optimal and competitive equilibrium allocations for $\theta = 1$ and $\theta = 1/2$.

Time and Uncertainty

In practice, consumption and production activities take place over *time*. Moreover, at each point in time there is *uncertainty* about the circumstances in which these activities take place.

Incorporating time and uncertainty explicitly in the description of the economy requires some elaboration, e.g., one needs to specify how the firms' production possibilities evolve over time or depend on the state of nature, how risk affects a consumer's welfare, etc.

And allocating resources involves deciding the *timing* of production and consumption activities conditional on the *state of nature*.

In order to fix ideas, assume that:

$\triangleright$**time** progresses discretely (rather than continuously) during a number of consecutive dates $1, 2, ...T$, and

$\triangleright$the **uncertainty** is described by a finite probability space.

In this case the uncertainty and temporal structure may be represented by a tree – give examples.

Time and Uncertainty

The set of states of nature is a list of the possible elementary, mutually exclusive events that may occur at time T,

$$\Omega = \{\omega_1, ...\omega_s\}.$$

The information of the economic agents may be described by a sequence of partitions of Ω,

$$\mathcal{P}_1, ..., \mathcal{P}_T$$

At date t agents know which of the events in $\mathcal{P}_t$ has occurred, but if $A \in \mathcal{P}_t$ has occurred and $\omega, \omega' \in \mathcal{A}$, then they cannot tell whether the realized state of nature is ω or ω'.

It is natural to assume that for all t, $\mathcal{P}_{t+1}$ is finer than $\mathcal{P}_t$; that is, $A \in \mathcal{P}_{t+1}$, then there is $A' \in \mathcal{P}_t$ such that $A \subset A'$. (This assumes that agents can recall.)

Time and Uncertainty

A first approach to dealing with time and uncertainty suggested by classical microeconomics, e.g., Debreu (1959), chapter 7, consist of assuming the existence of competitive markets for the exchange of contingent contracts.

A contingent contract involves a commitment by an agent (the seller) to deliver a number of units of a certain commodity to another agent (the buyer),

$\triangleright$on a specific (future) date t,

$\triangleright$on the condition that a certain event $A \in \mathcal{P}_t$ occurs

in exchange for a payment made at the moment of formalizing the contract.

(Contingencies must refer to events observed by all parties, including the external authority enforcing the contracts. If A does not occur, then the seller has no obligation.)

According to this approach, dealing with time and uncertainty merely requires expanding the set of goods in the economy: a good is defined by what it is, by the date at which it is available and by the event on which it is available (and perhaps also by the location at which it is available, etc.).

The existence of competitive markets for the exchange of contingent contract leads, under *appropriate conditions*, to an efficient allocation of resources, which implies in particular *sharing and distributing risks efficiently*. (An implication of the First Welfare Theorem).

However,

▷Interpreting and assessing the plausibility of the conditions establishing existence and Pareto optimality of CE requires some elaboration to make explicit the role of time and uncertainty.

▷In particular, assuming the existence of a complete set of markets for contingent contracts (as well as a judicial system capable of enforcing these complex contracts) may be questionable ...

▷.... which leads us to study the interplay of financial markets (credit, insurance), spot markets for goods and markets for contingent contracts (e.g., future markets).

An impediment for contingent contracting, and hence for the existence of a complete set of markets, is the presence of asymmetric information about uncertain events, or the impossibility of verifying actions, restricting the possible contingencies that contracts may consider.

Thus, asymmetric information:

▷invalidates the results of classic microeconomics, and

▷poses important questions about the role of institutions (other than markets) in the allocation of resources.

The Economics of Information provides a theory of incentives for the analysis of the effects of private information or hidden actions in contractual settings.

As we shall see, this theory allows for sophisticated contract design which alleviates, but does not eliminate, the restrictions imposed by asymmetric information.