Introduction & General Equilibrium I

Advanced Microeconomics - Pratical Lecture 1

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Exercise 1.1
Problem Set 1

> **2 Agents:** Person 1 | Person 2
> **2 Goods:** Good X | Good Y
> **Endowments:** $W_X^1 = 30, W_Y^1 = 120$ | $W_X^2 = 180, W_Y^2 = 90$
> $W_j^i \rightarrow$ Endowment of good j to agent i.
> **Utility Functions:** $U(X_1, Y_1) = X_1 Y_1$ | $U(X_2, Y_2) = X_2 Y_2$
> $X_i \rightarrow$ Amount of good X consumed by Person i.
> $Y_i \rightarrow$ Amount of good Y consumed by Person i.

a) Graph the **Edgeworth box** corresponding to this economy.

Edgeworth Box

Graphical tool to analyze the exchange of two goods between two agents.
It allows us to represent all the feasible allocations, as well as agents' preferences.
The width of the Edgeworth Box corresponds to the total amount of good X and the height corresponds to the total amount of good Y.

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b) What are the equations for the **indifference curves** of persons 1 and 2 that go through the initial endowment? Plot the curves.

Indifference Curve

Set of allocations that give the same level of utility to the agent. Therefore, the agent is indifferent between any of the bundles that lie in the same indifference curve.

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c) Shade the locus of points that are **Pareto-superior** to the initial endowments.

Mutual Advantages Set

Set of allocations where at least one agent is better off in relation to the initial endowment allocation without making the other agent worse off (in relation to the initial endowment allocation).

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The **Mutual Advantages Set** may also be called **Pareto Superior Set**.

Pareto Improvement

Moving from the initial endowment allocation to an allocation in the Mutual Advantages Set.

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d) What is the equation of the **contract curve** in this economy? Graph it.

Contract Curve

Set of all the Pareto Efficient allocations.

Pareto Efficient Allocation

An allocation in which it is not possible to make some agent better without making the other agent worse off. Hence, at this allocation, all the gains from trade have been exhausted and Pareto improvements are no longer possible.

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> $X_i \rightarrow$ Amount of good X consumed by Person i.
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>
> **e)** Identify the **boundaries** of the points on the contract curve that are Pareto-superior to the initial endowments.

Core

Set of Pareto Efficient allocations that do not leave any agent worse off in relation to the initial endowment allocation.
Intersection of the Contract Curve with the Mutual Advantages Set.

2 Agents: Person 1 | Person 2

2 Goods: Good X | Good Y

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Utility Functions: $U(X_1, Y_1) = X_1 Y_1$ | $U(X_2, Y_2) = X_2 Y_2$

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f) Suppose a secretary of the market announces that all trading must take place at $P_X = 1$ and $P_Y = 2$. Furthermore, the secretary takes away each person's initial endowment and replaces it with its cash value. The secretary instructs each person to order the quantities of X and Y that maximize utility subject to the budget constraint.

   (1) What quantities will persons 1 and 2 order?

   (2) Can the secretary fill these orders with the endowments collected? Go through the same exercise with $P_X = 2$ and explain why the outcome is feasible and efficient.

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Share Rule

If a consumer has preferences which can be represented by Cobb-Douglas preferences:
$U_i(X_i, Y_i) = X_i^\alpha Y_i^\beta$ (with $\alpha, \beta > 0$), then:

$$X_i^* = \frac{\alpha}{\alpha+\beta} \frac{P_X W_X^i + P_Y W_Y^i}{P_X}$$

$$Y_i^* = \frac{\beta}{\alpha+\beta} \frac{P_X W_X^i + P_Y W_Y^i}{P_Y}$$

2 Agents: B → Bert | E → Ernie

2 Goods: f → food | c → clothing

Endowments: $W_f^B = 10, W_c^B = 10$ | $W_f^E = 10, W_c^E = 20$

a) Represent these initial endowments in an **Edgeworth box**.

b) Bert regards food and clothing as perfect **1-for-1 substitutes**. Ernie regards them as **perfect complements**, always wanting **3 units of clothing for every 2 units of food**. Describe the set of allocations that are Pareto preferred to initial endowment.

c) Describe the **contract curve** for that allocation.

d) What **price ratio** will be required to sustain an allocation on the contract curve?

e) How will your answers differ in 5 units of Ernie's clothing endowment are given to Bert?