AE 503

PRODUCTION AND EXCHANGE

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In the simple exchange economy, production was ignored

Suppose each good is produced by a single firm, using labor and capital

Assume production technology for fruit is relatively labor-intensive, and production technology for fish is relatively capital-intensive, and amounts of labor and capital are fixed in supply

Production technology also exhibits constant returns to scale

Production possibilities of economy can be expressed in terms of a production possibilities frontier
PRODUCTION POSSIBILITIES FRONTIER

Slope of frontier = marginal rate of transformation = \( MRT_{1,2} \)
The production possibilities frontier traces out production combinations of the two goods, given the fixed supplies of labor and capital, and technology.

The shape of the frontier, which is concave to the origin, is determined by the input-intensity of the production technologies, and fixed supplies of the inputs.

The slope of the frontier at any point = the marginal rate of transformation = MRT_{1,2}.

This is the rate at which the output of one good can be increased as output of the other good is reduced, given technology and fixed supplies of labor and capital.

At any point on the frontier, available inputs are fully employed, i.e. there is Pareto efficiency in production.

If either technology improves or the supplies of capital and labor increase, the frontier shifts out.
How do we determine where on the production possibilities frontier the economy goes to?

We introduce a concept known as community indifference curves.

If both consumers have well-behaved preferences, these can be aggregated together to give community indifference curves.

Community indifference curves, which are convex, describe what the economy will demand under various price and income combinations.

The slope of a community indifference curve at any point is the economy’s marginal rate of substitution between the two goods.

Production will occur where a community indifference curve is just tangent to the production possibilities frontier (See next figure)
CHOICE OF PRODUCTION POINT

Community Indifference Curve

Production Frontier

Fish

T

Fruit

T'

x^1

x^2
Edgeworth Box

Contract Curve

Edgeworth Box

O^A

O^B

x^1

x^2

A_4

B_4

e'
PRODUCTION AND EDGEWORTH BOX

Community Indifference Curve

Production Frontier
PRODUCTION AND EDGECWORTH BOX

- Community Indifference Curve
- Edgeworth Box
- Contract Curve
- Production Frontier

The diagram illustrates the relationship between production and the Edgeworth Box, with key points labeled as O^B = e, e', A_4, B_4, O^A, x^1, and T'.
PRODUCTION AND EDGELWORTH BOX

Community Indifference Curve

Edgeworth Box

Production Frontier

Contract Curve
SIMULTANEOUS EFFICIENCY IN PRODUCTION AND EXCHANGE
At point e, the community indifference curve is tangent to the production possibility frontier:

- This implies a set of prices, \(-p_1/p_2\), which equalizes supply and demand.

- The price line can also be thought of as *either* the value of production *or* the economy’s level of income.

At point e, there is also *simultaneous efficiency* in production and exchange:

- *Efficiency in exchange* occurs at point e', i.e.
  
  \[ \text{MRS}^{A}_{1,2} = \text{MRS}^{B}_{1,2} = -p_1/p_2 \]

- *Efficiency in production* occurs at point e, i.e.
  
  \[ \text{MRT}_{1,2} = -p_1/p_2 \]

- *Simultaneous efficiency* in production and exchange occurs, i.e.
  
  \[ \text{MRT}_{1,2} = \text{MRS}^{A}_{1,2} = \text{MRS}^{B}_{1,2} = -p_1/p_2 \]