

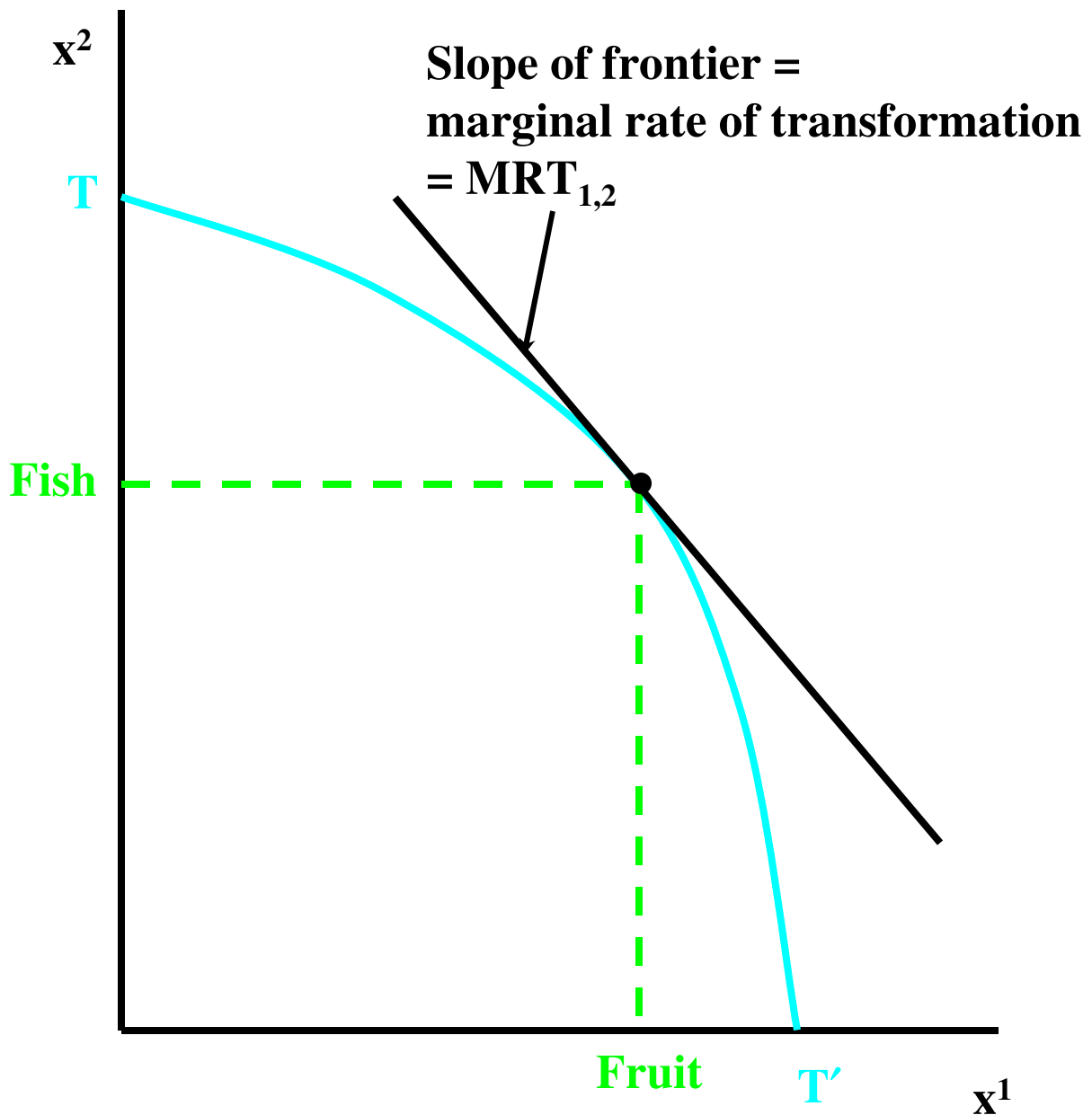
AE 503

PRODUCTION AND EXCHANGE

Professor Ian Sheldon

- 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*

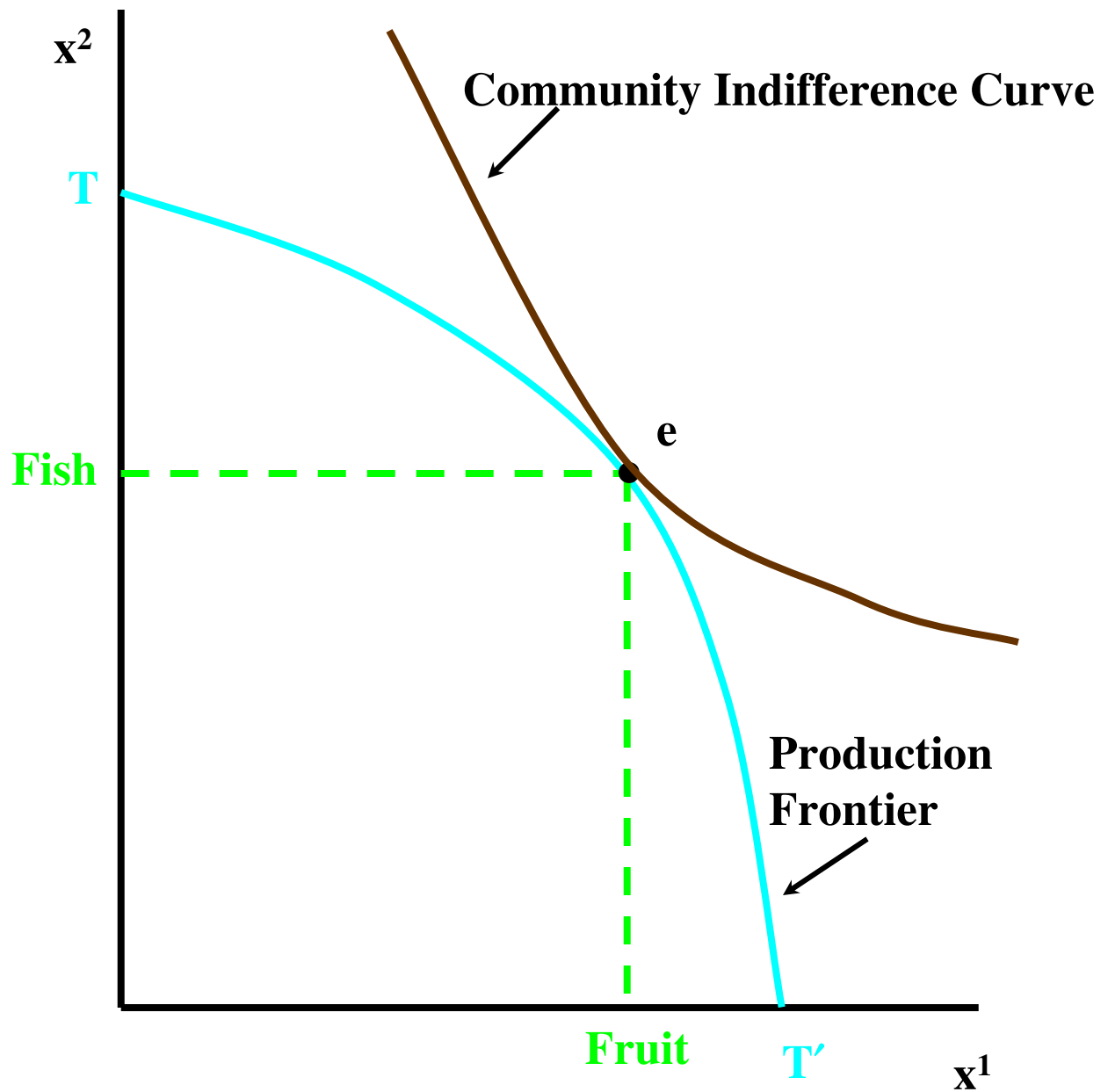
PRODUCTION POSSIBILITIES FRONTIER

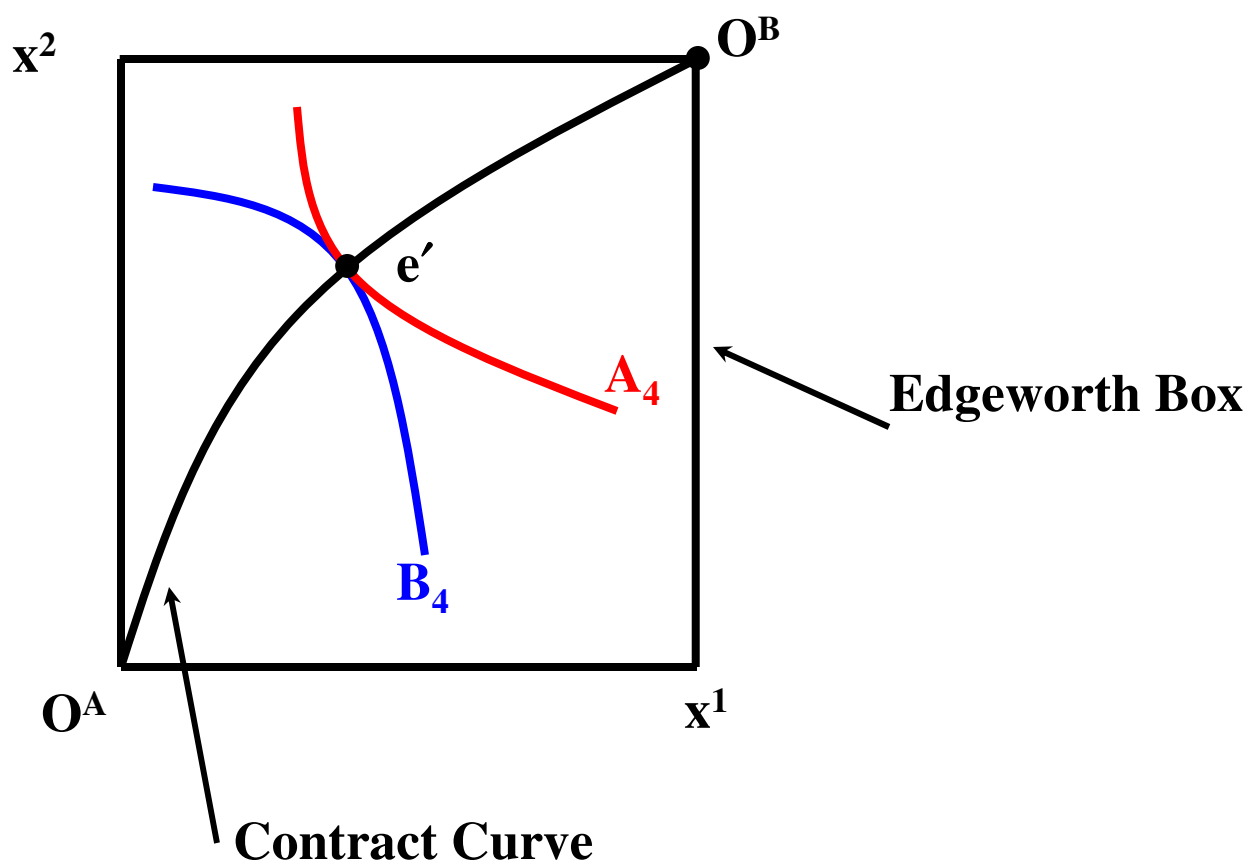


- The *production possibilities frontier* **TT'** traces out production combinations of the two goods, given the fixed supplies of labor and capital, and technology
- The *shape* of the frontier, which is *concave* to the origin, is determined by the input-intensity of the production technologies, and 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

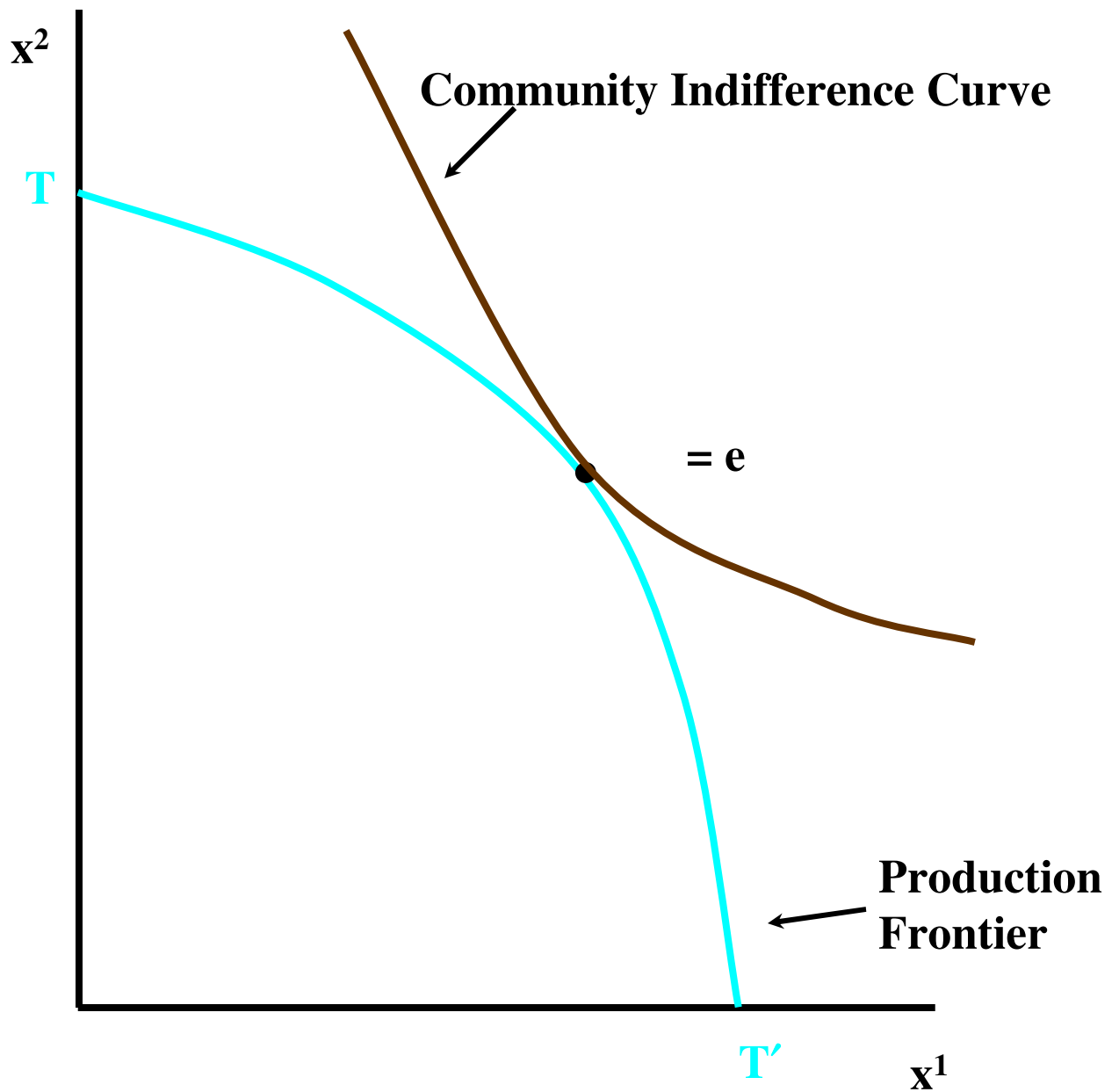
- How do we determine where on the production possibilities frontier the economy goes to?
- We introduce a concept known as *community indifference curves*
- If both consumers have well-behaved preferences, these can be aggregated together to give community indifference curves
- Community indifference 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

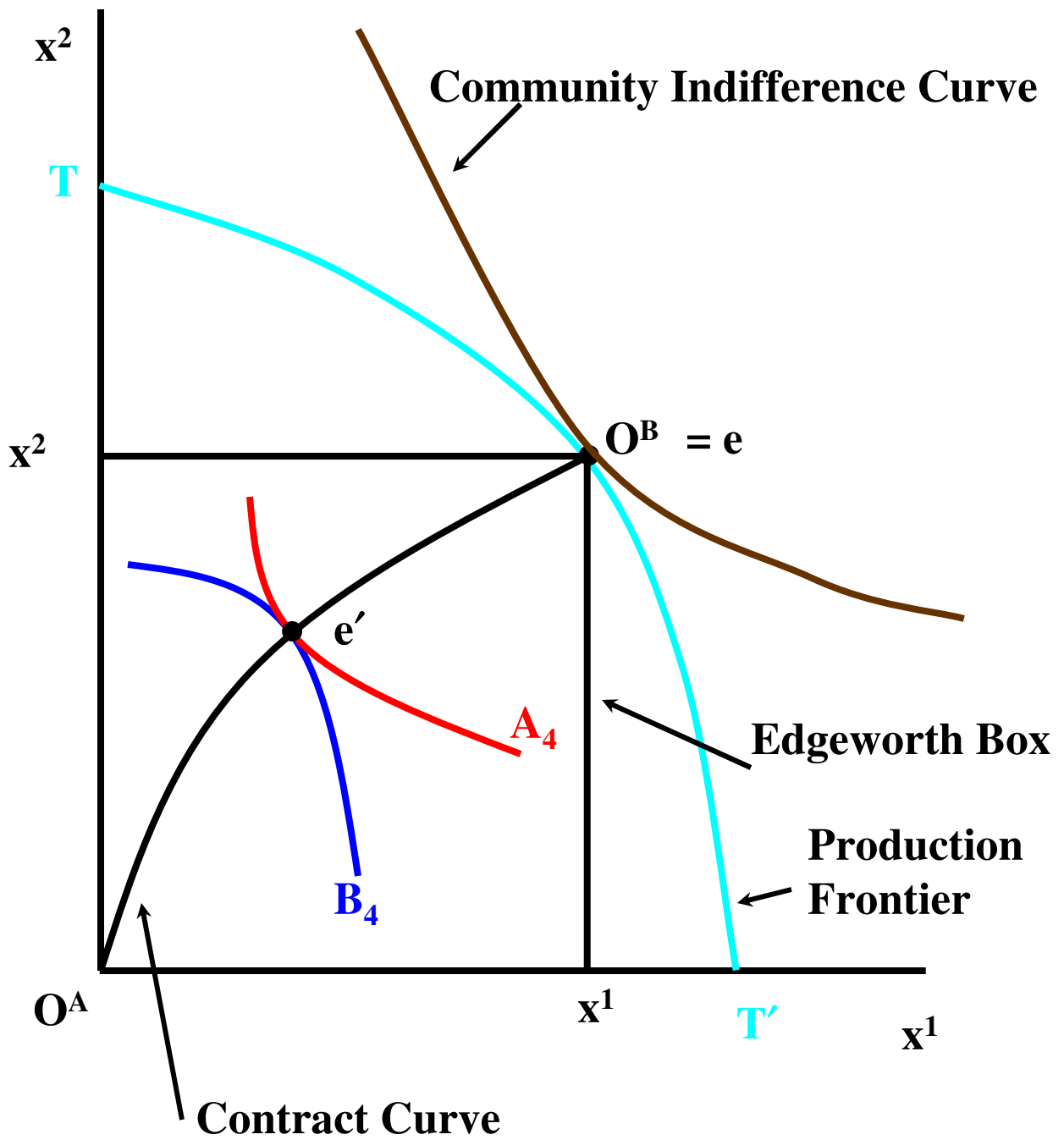




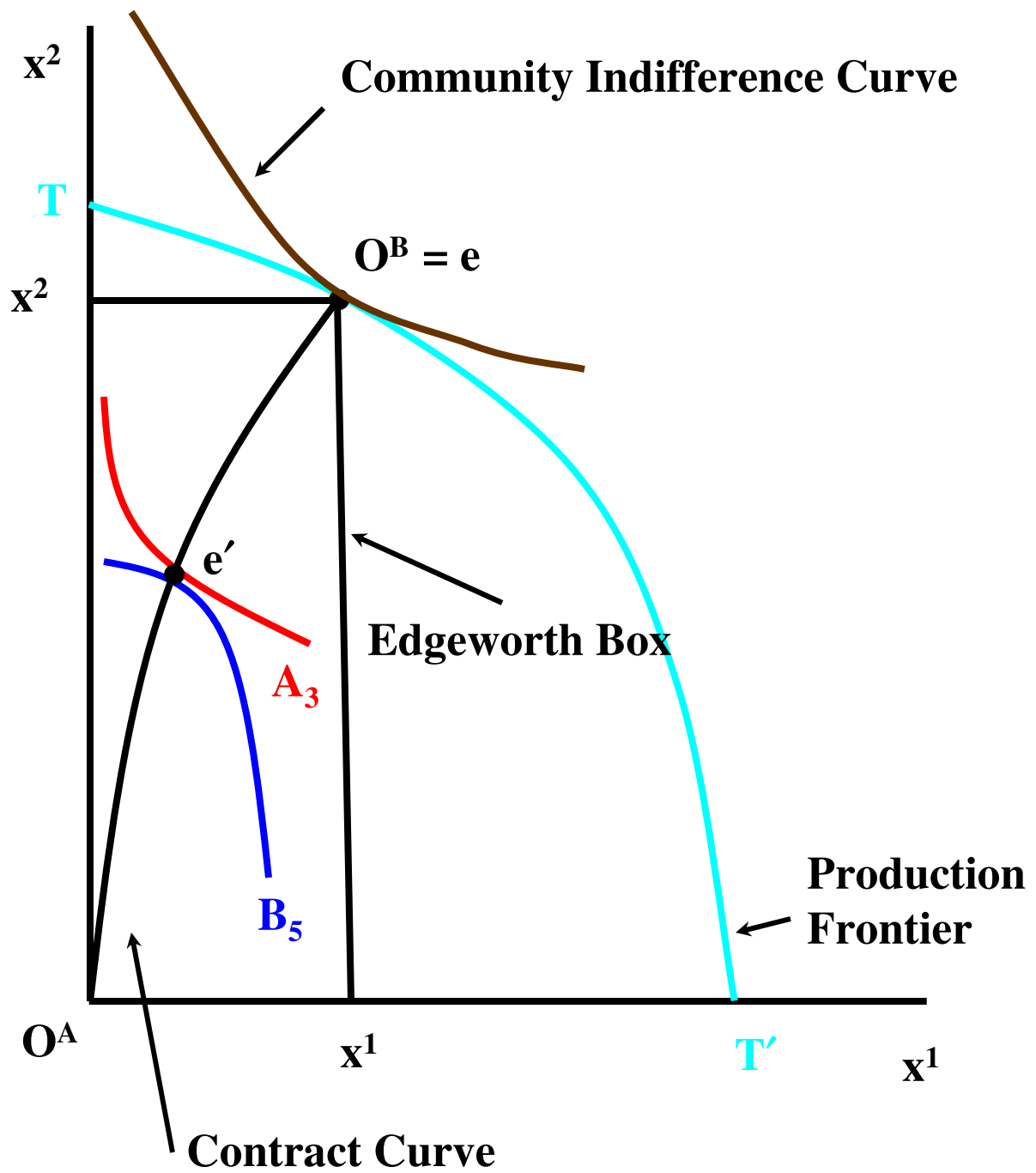
PRODUCTION AND EDGEWORTH BOX



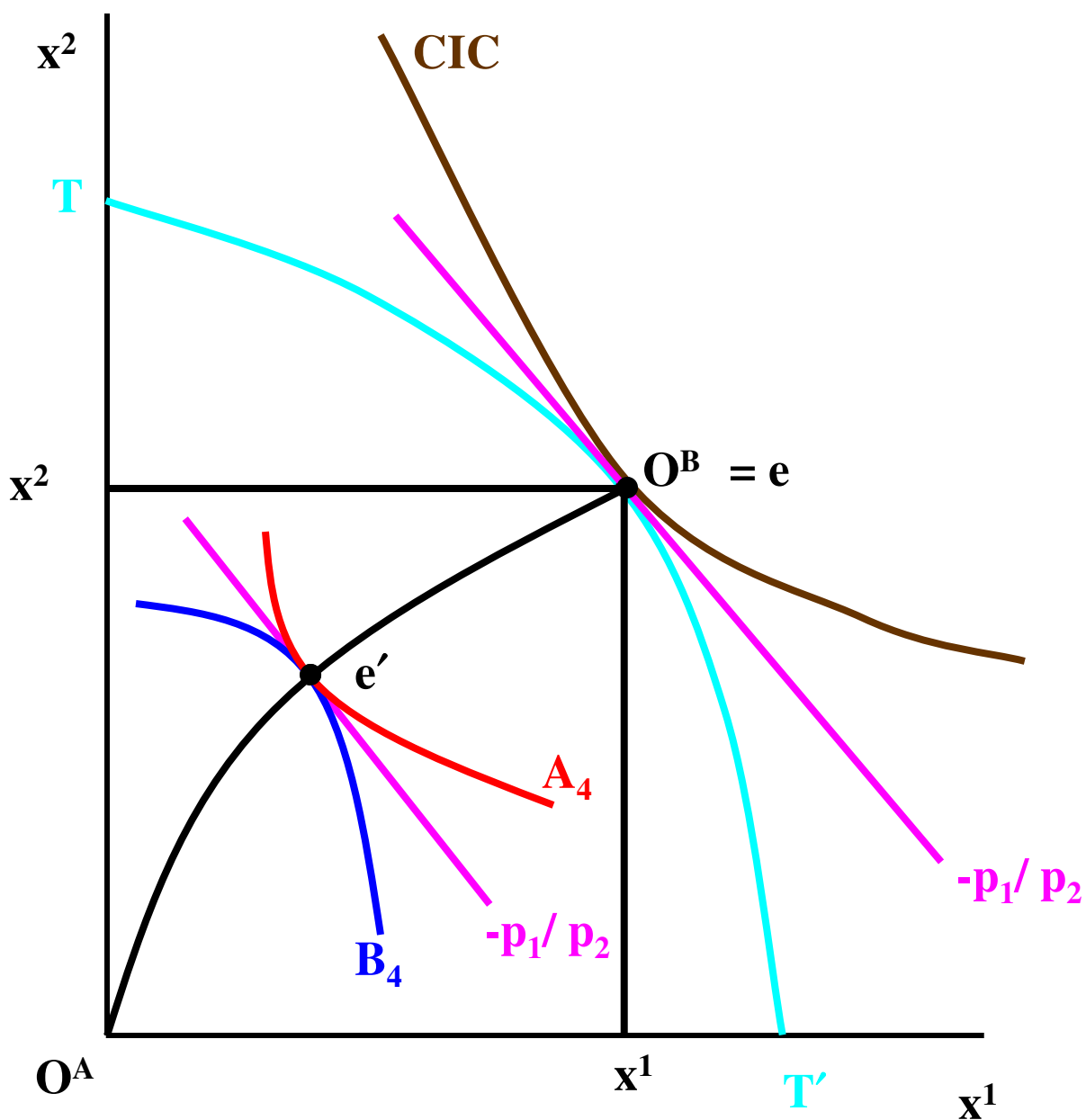
PRODUCTION AND EDGEWORTH BOX



PRODUCTION AND EDGEWORTH BOX



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.

$$MRS^A_{1,2} = MRS^B_{1,2} = -p_1/p_2$$

☞ *Efficiency in production* occurs at point e, i.e.

$$MRT_{1,2} = -p_1/p_2$$

☞ *Simultaneous efficiency* in production and exchange occurs, i.e.

$$MRT_{1,2} = MRS^A_{1,2} = MRS^B_{1,2} = -p_1/p_2$$