

LECTURE 9: General Equilibrium and Economic Efficiency

- General Equilibrium and Economic Efficiency
- Overview
- The Efficiency of Competitive Markets
- Equity and Efficiency
- The Gains from Free Trade

Efficiency in Exchange 교환의 효율성

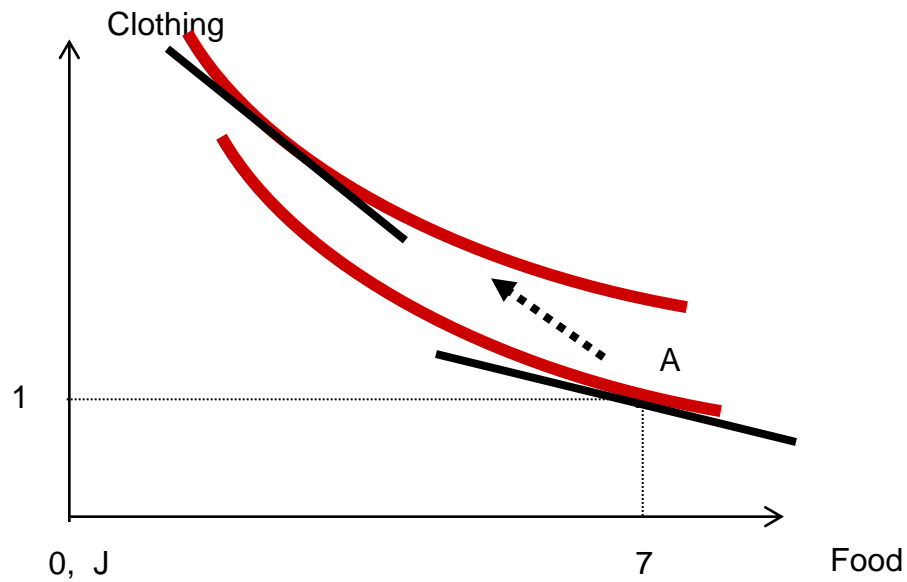
- An efficient allocation of goods is one where no one can be made better off without making someone else worse off
 - ▣ Pareto efficiency
- Voluntary trade between two parties is mutually beneficial and increases economic efficiency.

The Advantages of Trade

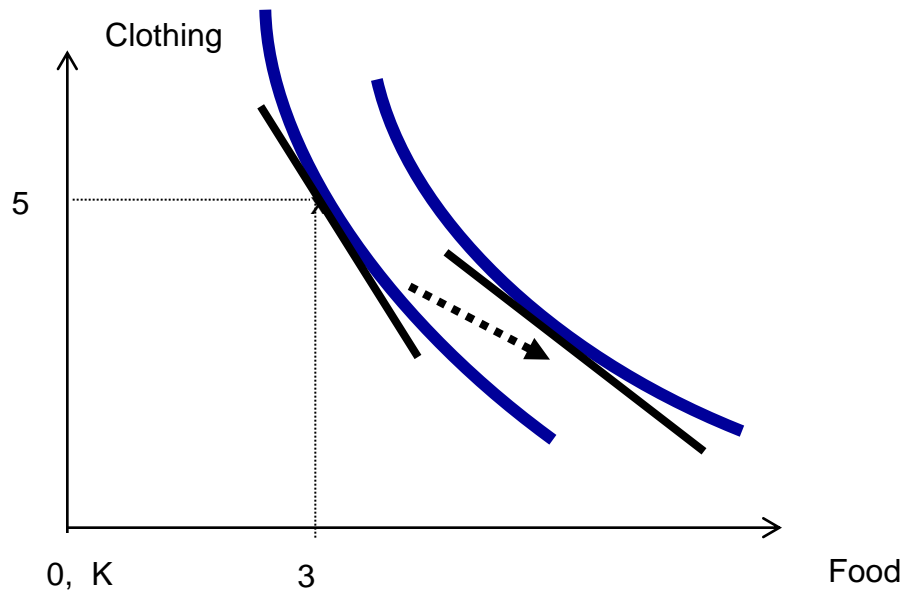
□ Assumptions

- Two consumers (countries)
- Two goods
- Both people know each others preferences
- Exchanging goods involves zero transaction costs
- John & Kate have a total of 10 units of food and 6 units of clothing.

Efficiency in Exchange



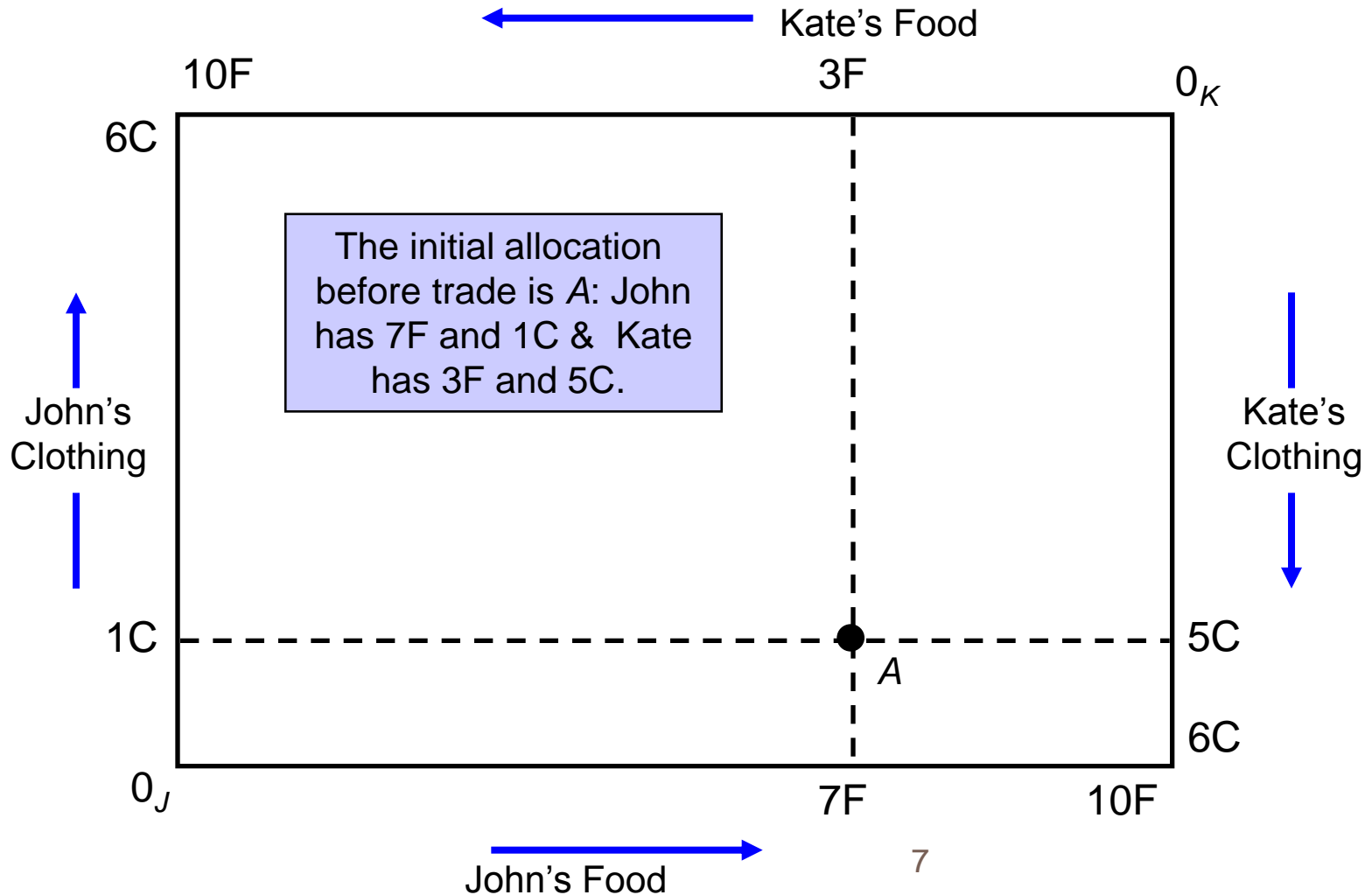
Efficiency in Exchange



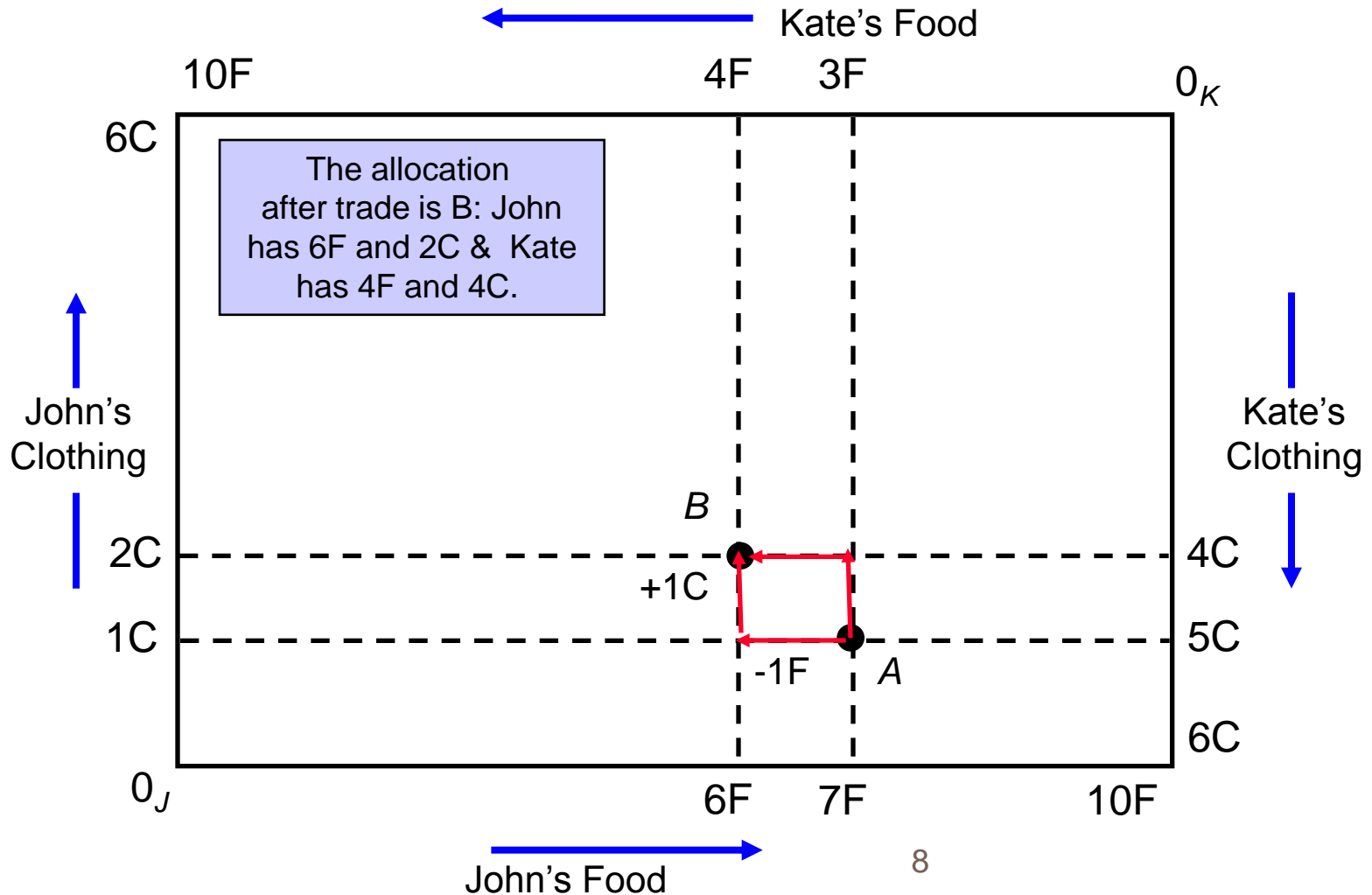
The Advantage of Trade

- There is room for trade
 - ▣ John values clothing more than Kate
 - ▣ Kate values food more than John
 - ▣ Kate willing to give up 3 units of clothing to get 1 unit of food, but John is willing to take only $\frac{1}{2}$ unit of clothing for 1 unit of food
- Actual terms of trade are determined through bargaining
 - ▣ Trade for 1 unit of food will fall between $\frac{1}{2}$ and 3 units of clothing

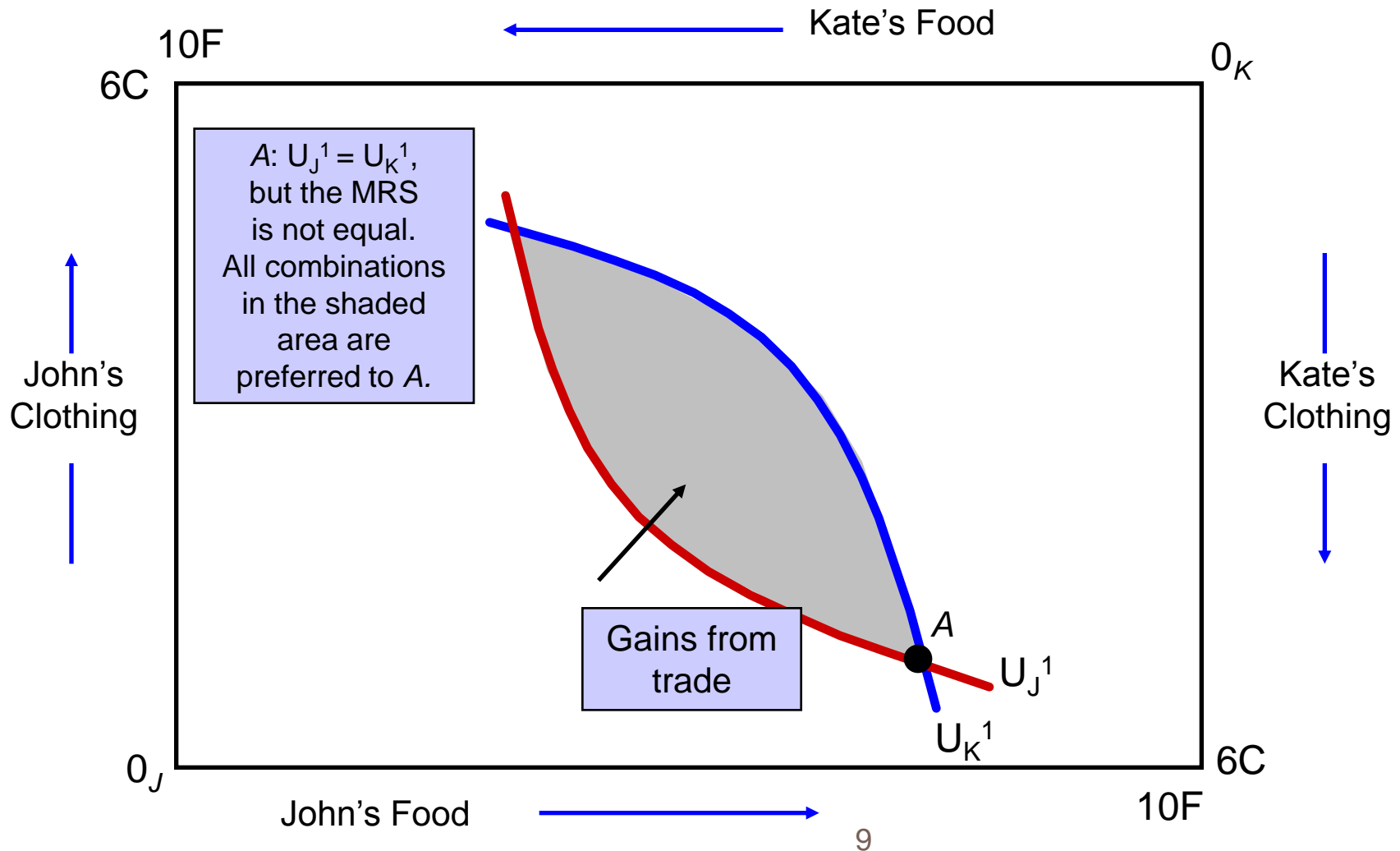
Exchange in an Edgeworth Box



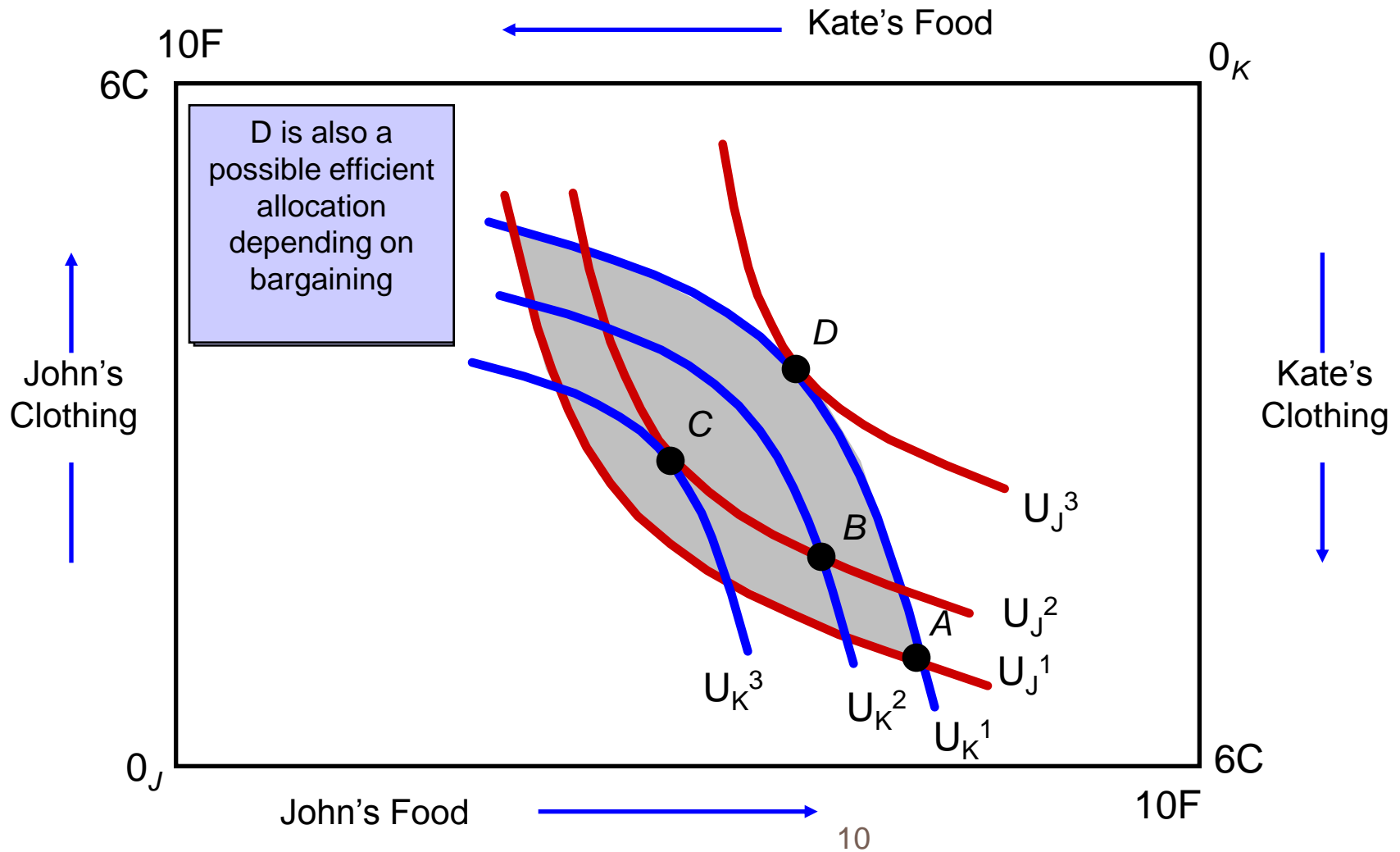
Exchange in an Edgeworth Box



Efficiency in Exchange

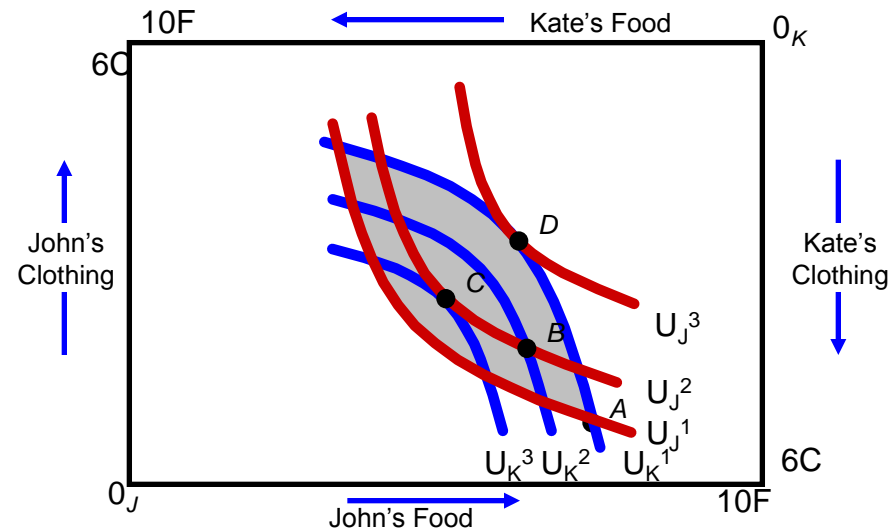


Efficiency in Exchange



Efficiency in Exchange

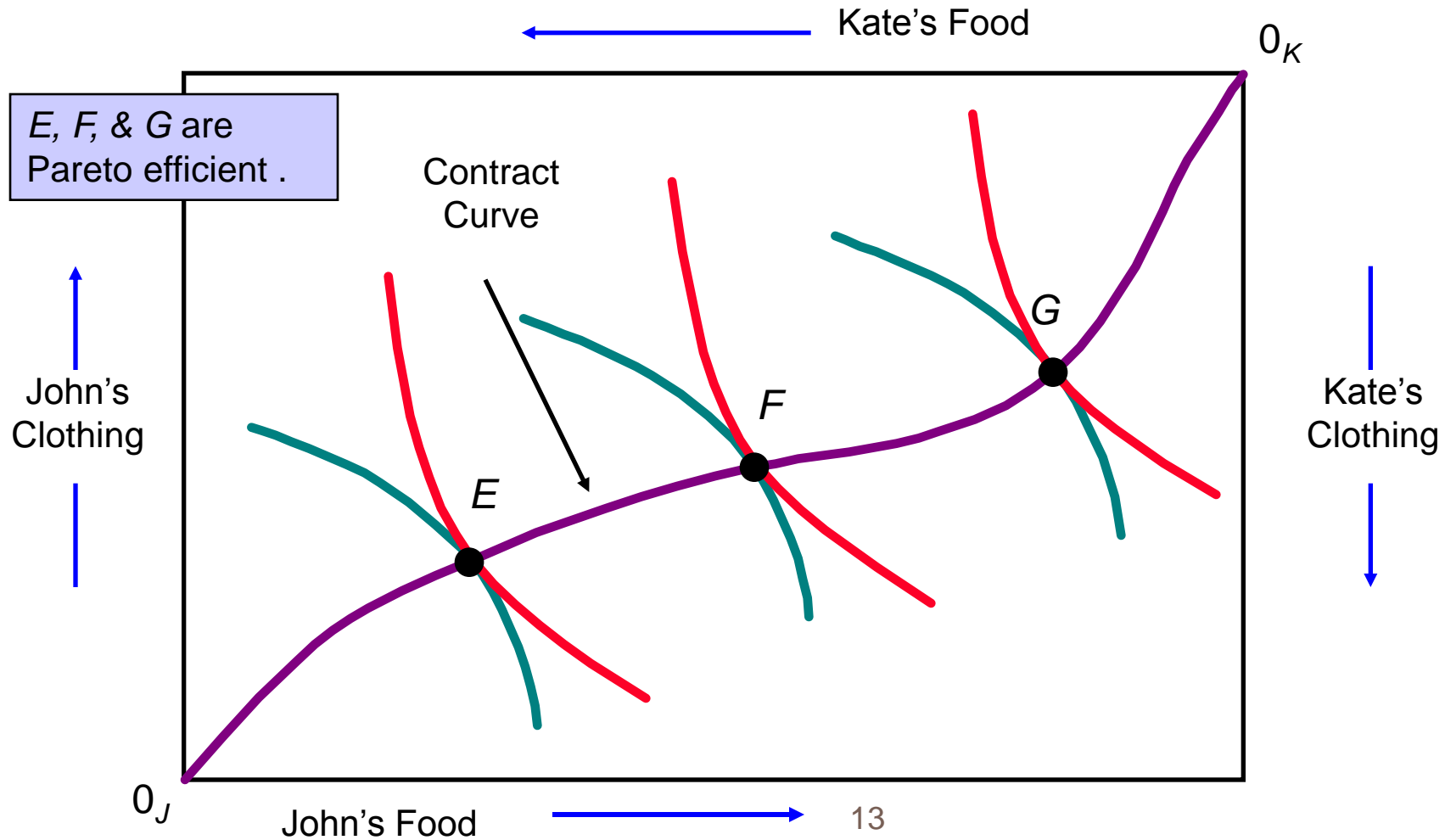
- Any move outside the shaded area will make one person worse off (closer to their origin).
- B is a mutually beneficial trade--higher indifference curve for each person.
- Trade may be beneficial but not efficient.
- MRS is equal when indifference curves are tangent and the allocation is efficient.



Efficiency in Exchange

- The Contract Curve
 - ▣ To find all possible efficient allocations of food and clothing between Kate and John, we would look for all points of tangency between each of their indifference curves.
 - ▣ The **contract curve** shows all the efficient allocations of goods between two consumers, or of two inputs between two production functions

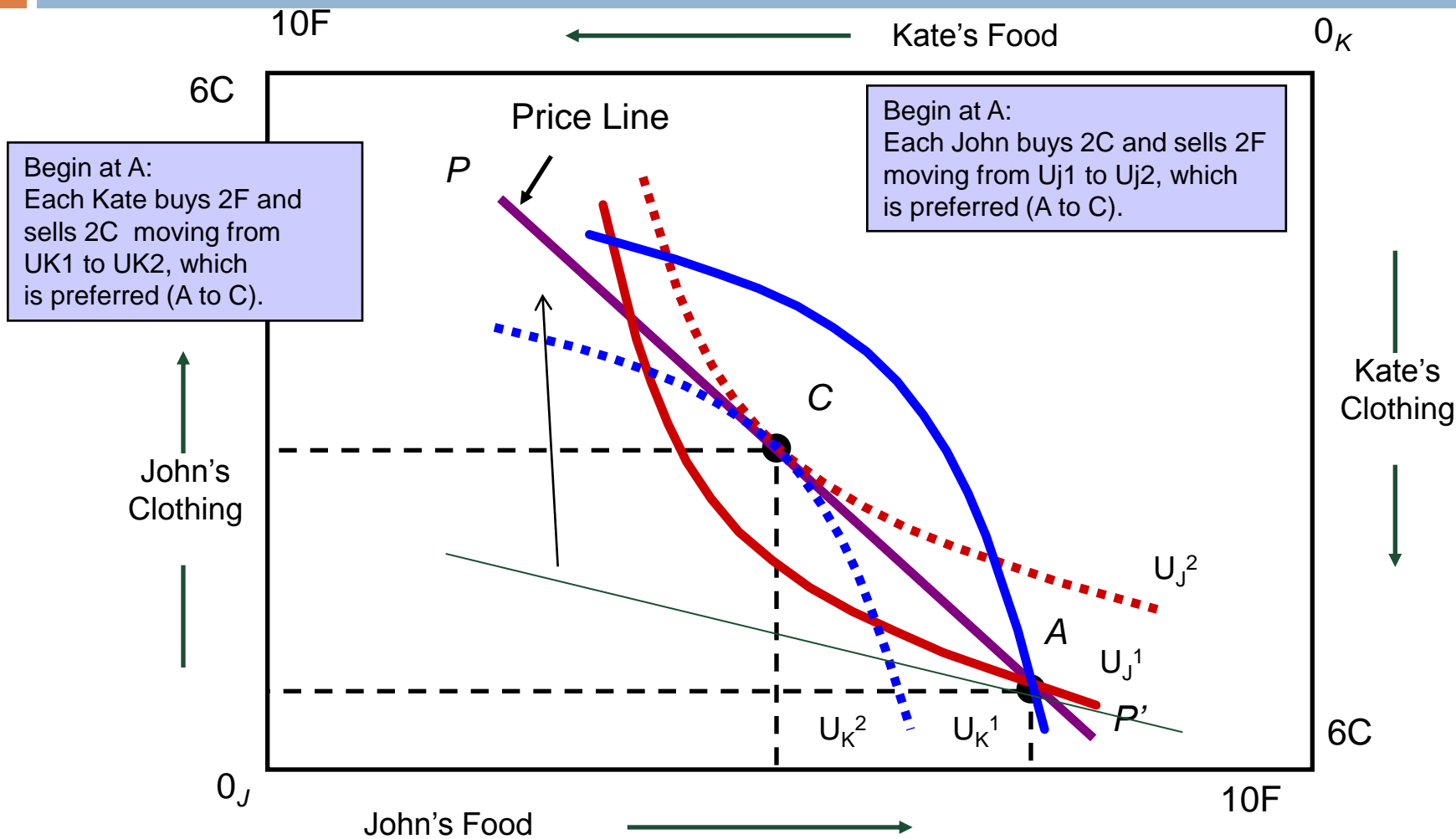
The Contract Curve 계약곡선



Contract curve

- All points of tangency between the indifference curves are efficient.
 - ▣ MRS of individuals is the same
 - ▣ No more room for trade
- The contract curve shows all allocations that are Pareto efficient.
 - ▣ Pareto efficient allocation occurs when further trade will make someone worse off.

Consumer Equilibrium in a Competitive Market



Begin at A:
Each Kate buys 2F and
sells 2C moving from
 U_K^1 to U_K^2 , which
is preferred (A to C).

Begin at A:
Each John buys 2C and sells 2F
moving from U_J^1 to U_J^2 , which
is preferred (A to C).

Efficiency in Exchange

- Consumer Equilibrium in a Competitive Market
 - ▣ Competitive markets have many actual or potential buyers and sellers, so if people do not like the terms of an exchange, they can look for another seller who offers better terms.

Consumer Equilibrium in a Competitive Market

- The amount of clothing that Kate wanted to sell is equal to the amount of clothing that John wanted to buy
- An **equilibrium** is a set of prices at which the quantity demanded equals the quantity supplied in every market
 - Also called **competitive, or market equilibrium**

Consumer Equilibrium in a Competitive Market

- Disequilibrium is only temporary in competitive market
 - ▣ Excess demand will cause price to rise
 - ▣ Excess supply will cause price to fall
- In our example, we have excess supply of clothing and excess demand of food
 - ▣ Should expect the price of food to increase relative to price of clothing
 - ▣ Prices adjust until equilibrium is reached

Economic Efficiency of Competitive Markets

- As shown before, we can see that the allocation in a competitive equilibrium is economically efficient
 - ▣ The efficient point must occur where the two indifference curves are tangent
 - ▣ If not, one of the consumers can increase their utility and be better off

Consumer Equilibrium in a Competitive Market

- In a general equilibrium setting where all markets are perfectly competitive, we can show the same result
 - ▣ Best example of Adam Smith's invisible hand
 - ▣ Economy will automatically allocate all resources efficiently without need for regulatory control
 - Supports argument for less government intervention and more highly competitive markets

Consumer Equilibrium in a Competitive Market

- First Theorem of Welfare Economics 후생경제학의 제1 정리
 - If everyone trades in a competitive market place, all mutually beneficial trades will be completed and the resulting equilibrium allocation of resources will be economically efficient
 - Welfare economics involves the normative evaluation of markets and economic policy

Consumer Equilibrium in a Competitive Market

- Competitive equilibrium
 1. Because the indifference curves are tangent, all MRSs are equal between consumers
 2. Because each indifference curve is tangent to the price line, each person's MRS is equal to the price ratio of the two goods

$$MRS_{FC}^J = \frac{P_C}{P_F} = MRS_{FC}^K$$

Consumer Equilibrium in a Competitive Market

- Difficult for efficient allocation with many consumer and producers unless all markets are perfectly competitive
- Efficient outcomes can also be achieved by centralized system
- Competitive outcome preferred since consumers and producers can better assess their preferences and supply

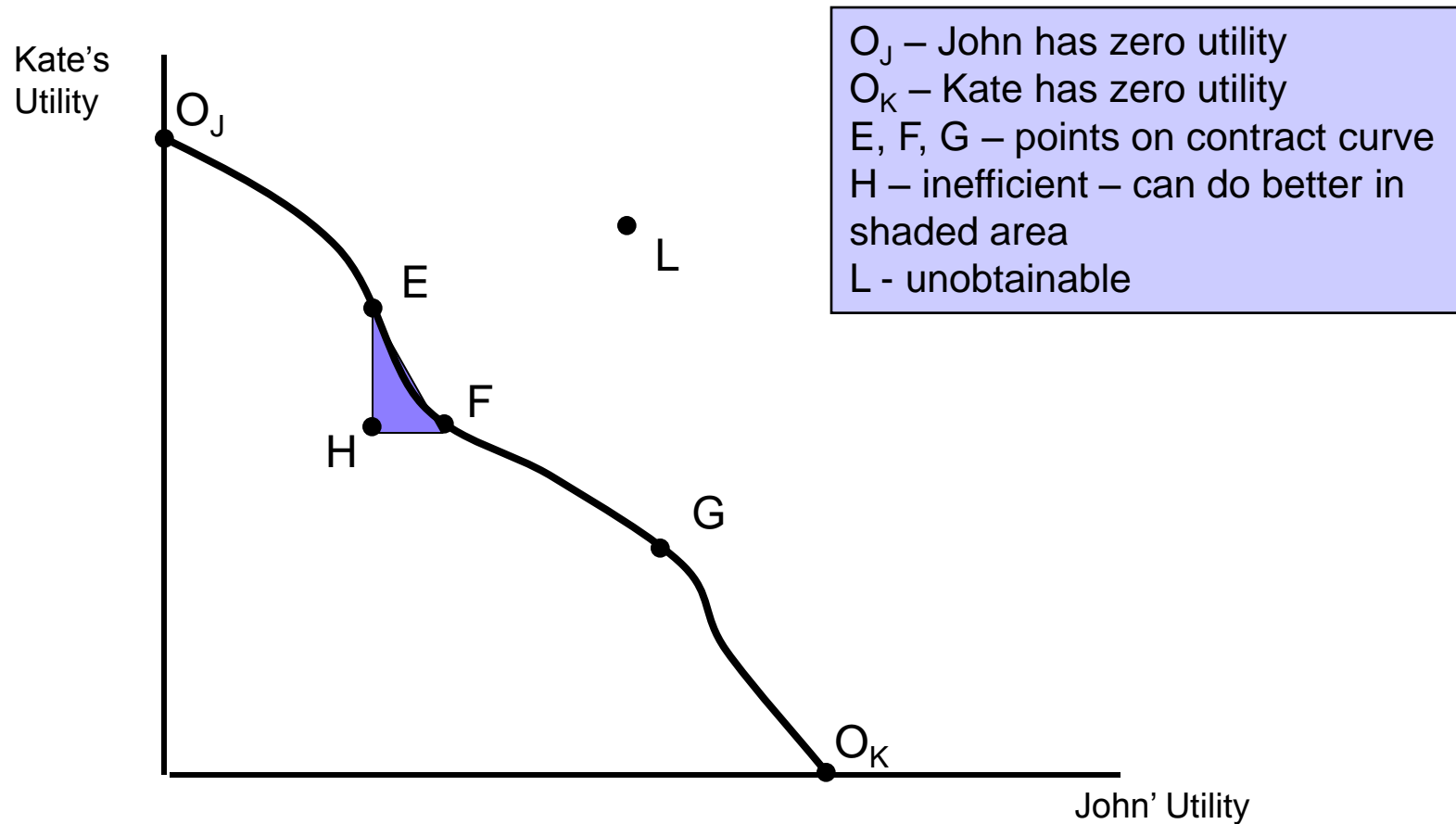
Equity and Efficiency 공정성과 효율성

- Although there are many efficient allocations, some may be more fair than others
- The difficult question is what is the most equitable allocation?
- We can show that there is no reason to believe that efficient allocation from competitive markets will give an equitable allocation

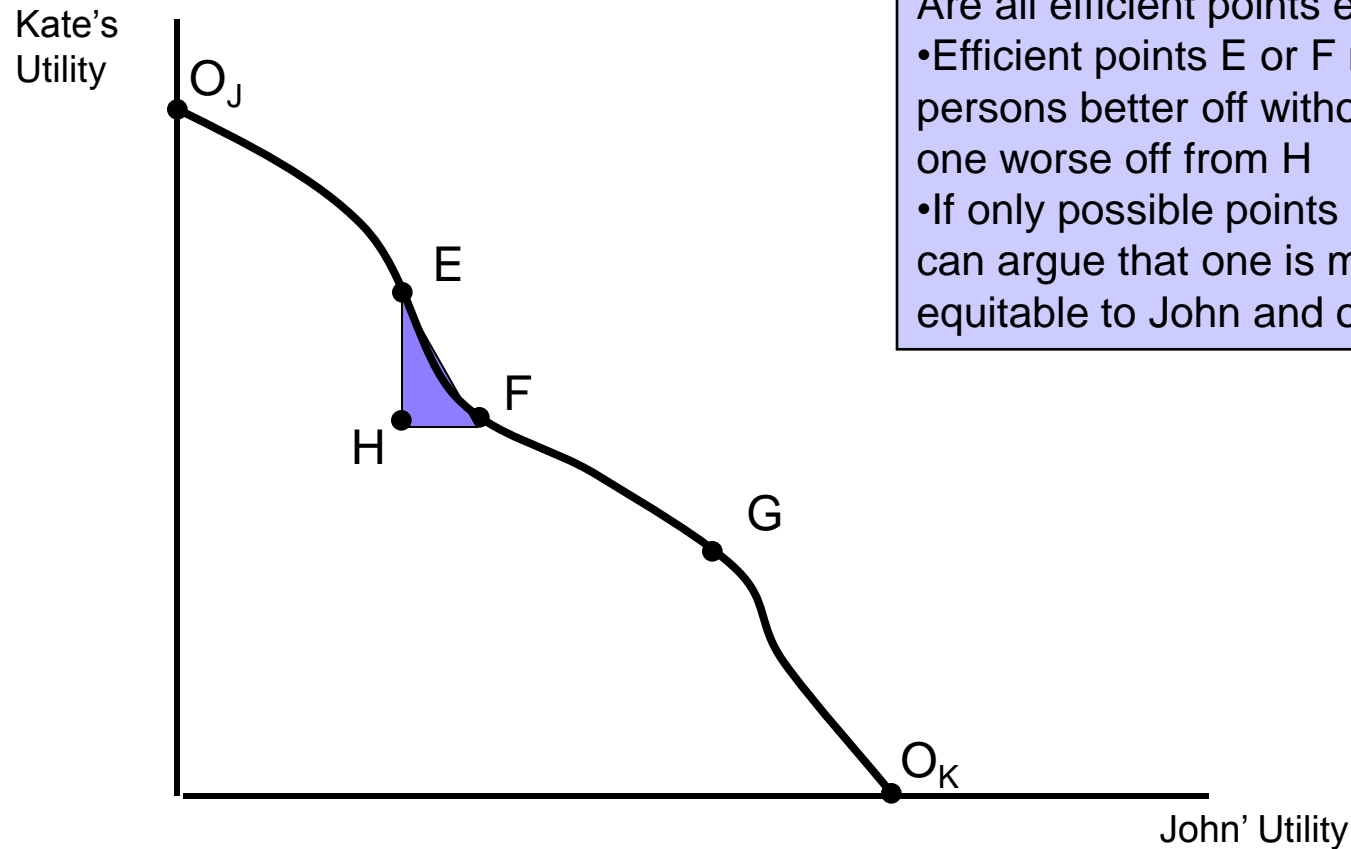
The Utility Possibilities Frontier

- From the Edgeworth box we showed a two person exchange
- The **utility possibilities frontier** represents all allocations that are efficient in terms of the utility levels of the two individuals
 - ▣ Shows the levels of satisfaction that are achieved when the two individuals have reached the contract curve

The Utility Possibilities Frontier



The Utility Possibilities Frontier



Are all efficient points equitable?

- Efficient points E or F make both persons better off without making one worse off from H
- If only possible points are H and G, can argue that one is more equitable to John and one to Kate

The Utility Possibilities Frontier

- From previous example, can see that an inefficient allocation might be more equitable than an efficient one.
- But how do we define an equitable allocation?
 - ▣ It depends on what we believe equity to entail
 - ▣ Requires interpersonal comparisons of utility

Social Welfare Functions

- Weights are often applied to individual's utility to determine what is socially desirable.
 - ▣ How these weights are applied comes from the social welfare functions
- The **utilitarian function** weights everyone's utility to maximize utility for the whole society

Social Welfare Functions 사회후생함수

- Each social welfare function is associated with a particular view of equity
- Some views of equity do not assign weights and cannot be represented by a welfare function
 - ▣ Competitive market process is equitable because it rewards those who are most able and work hardest
 - ▣ Believes competitive equilibrium would be most equitable

Social Welfare Functions

- The Rawlsian view individuals don't know what their endowment will be
- Rawls argues that if you don't know your own fate, you will opt for the system in which the least well-off person is treated reasonably well.
- *The most equitable allocation maximizes the utility of the least well-off person in society*

Social Welfare Functions

- An egalitarian view believes that goods should be equally shared by all individuals in society
- Could have situation where reward more productive people thereby producing more goods and then having more to reallocate to all of society

Four Views of Equity

Egalitarian	All members of society receive equal amount of goods
Rawlsian	Maximize the utility of the least-well-off person
Utilitarian	Maximize the total utility of all members of society
Market - Oriented	The market outcome is the most equitable

Equity and Perfect Competition

- A competitive equilibrium can occur at any point on the contract curve depending on the initial allocation.
- Since not all competitive equilibriums are equitable, we rely on the government to help reach equity by redistributing income.
 - Taxes
 - Public services

Equity and Perfect Competition

- Must a society that wants to be more equitable necessarily operate in an inefficient world?

Second Theorem of Welfare Economics

후생경제학의 제2 정리

If individual preferences are convex, then every efficient allocation (every point on the contract curve) is a competitive equilibrium for some initial allocation of goods.

Equity and Perfect Competition

- Any equilibrium that is equitable can be achieved by redistributing resources and may be efficient
- Typical ways to redistribute goods, however, are costly
 - ▣ Taxes lead to bad incentives
 - Firms devote fewer resources to avoid taxes
 - Encourage individuals to work less

Efficiency in Production

- Using the Edgeworth box diagram, we can similarly show the efficiency of market equilibrium with production

Producer Equilibrium – Competitive Input Markets

- We saw before that if producers minimize costs, they will choose inputs to the point where the ratio of the marginal products of the two inputs is equal to the ratio of input prices:

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

Producer Equilibrium – Competitive Input Markets

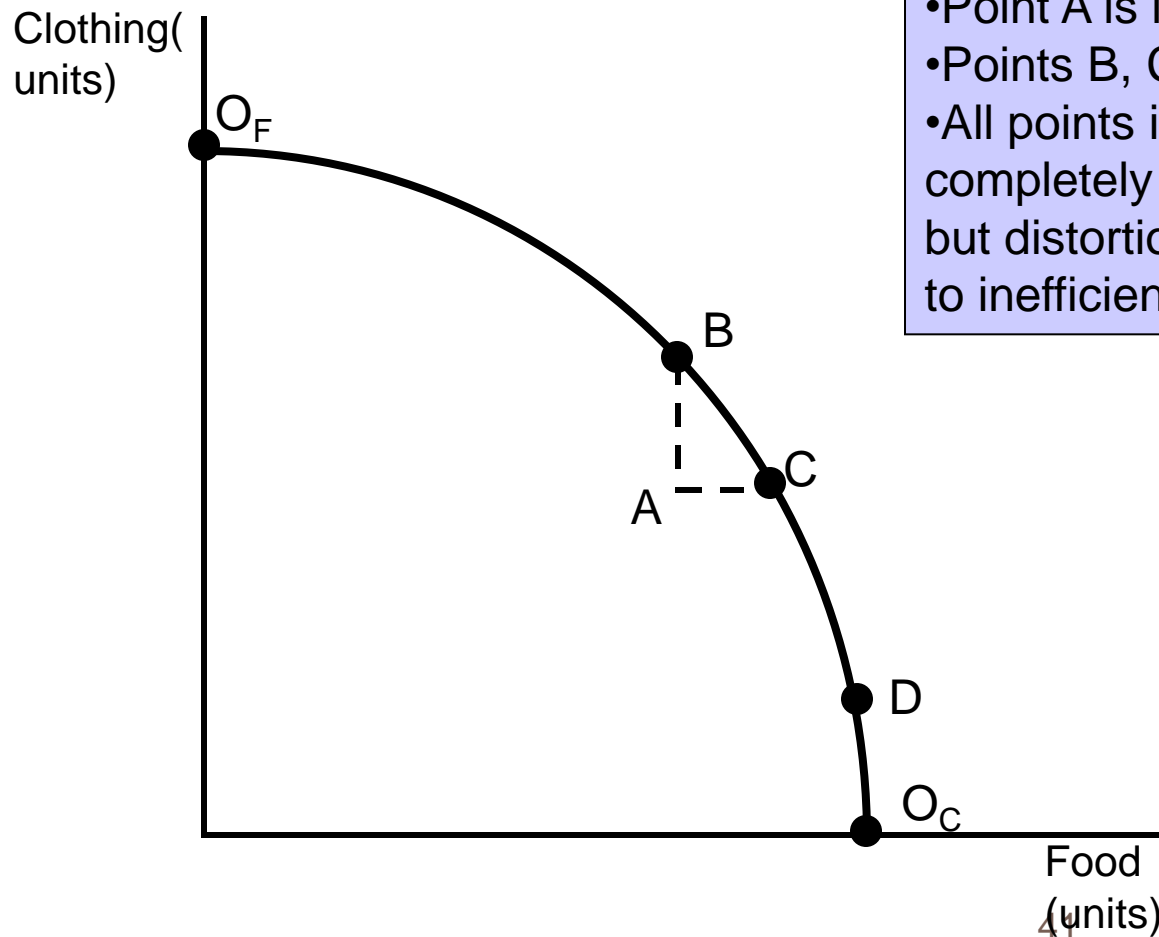
- Ratio of marginal products is the same as the marginal rate of technical substitution of labor for capital:

$$\frac{MP_L}{MP_K} = \frac{w}{r} = MRTS_{LK}$$

Production Possibilities Frontier

- PPF shows the various combinations of two goods that can be produced with fixed quantities of inputs.
- Frontier is derived from the production contract curve
- Points on PPF show efficiently produced levels of both goods

Production Possibilities Frontier

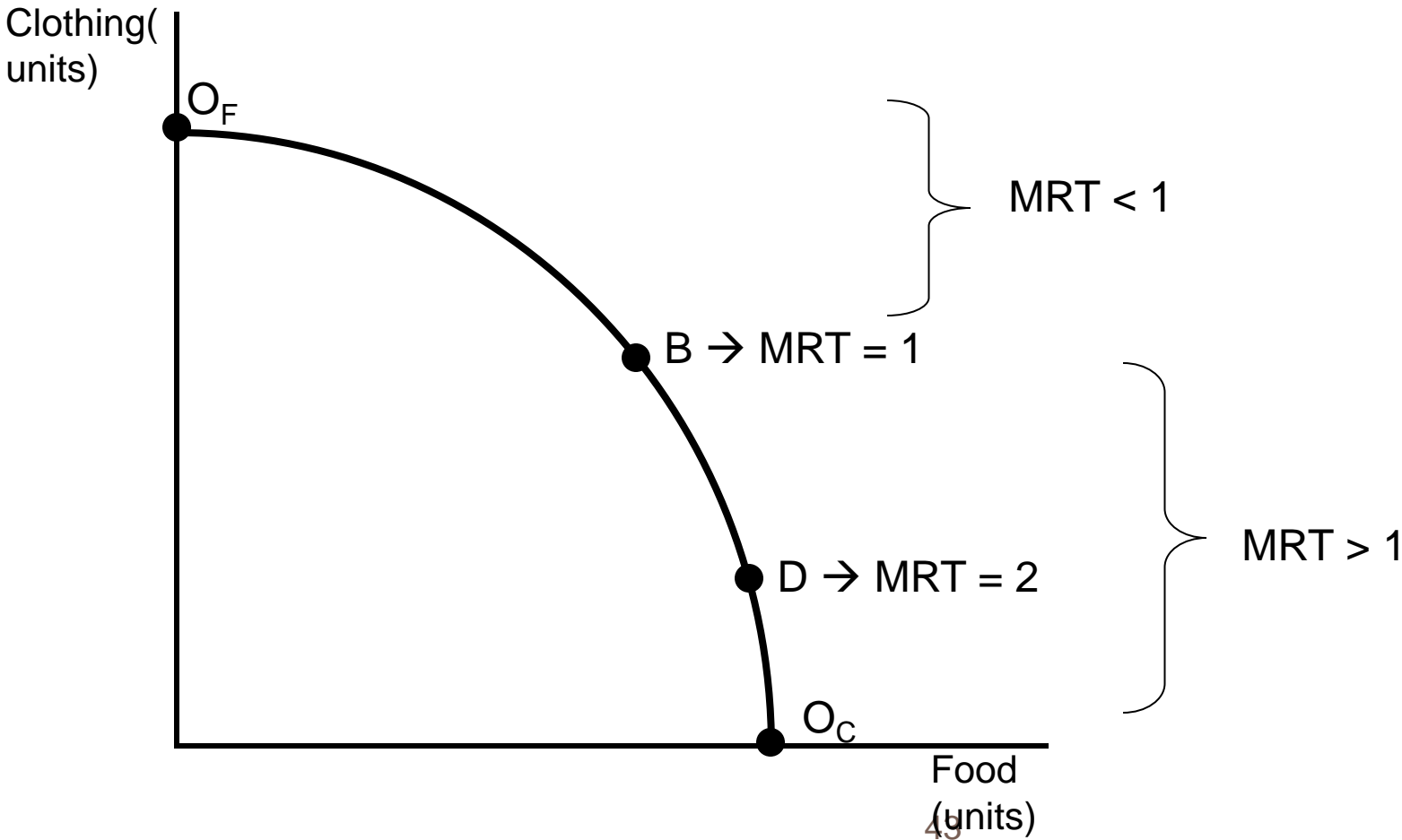


- Point A is inefficient
- Points B, C and D are efficient
- All points in triangle ABC completely utilize capital and labor but distortion in labor market leads to inefficient use

Production Possibilities Frontier

- PPF is downward sloping
 - ▣ In order to produce more of one good, must give up producing some of the other good
- PPF is concave
 - ▣ Slope is the $MRTS$ which increases as the level of production of food increases

Production Possibilities Frontier

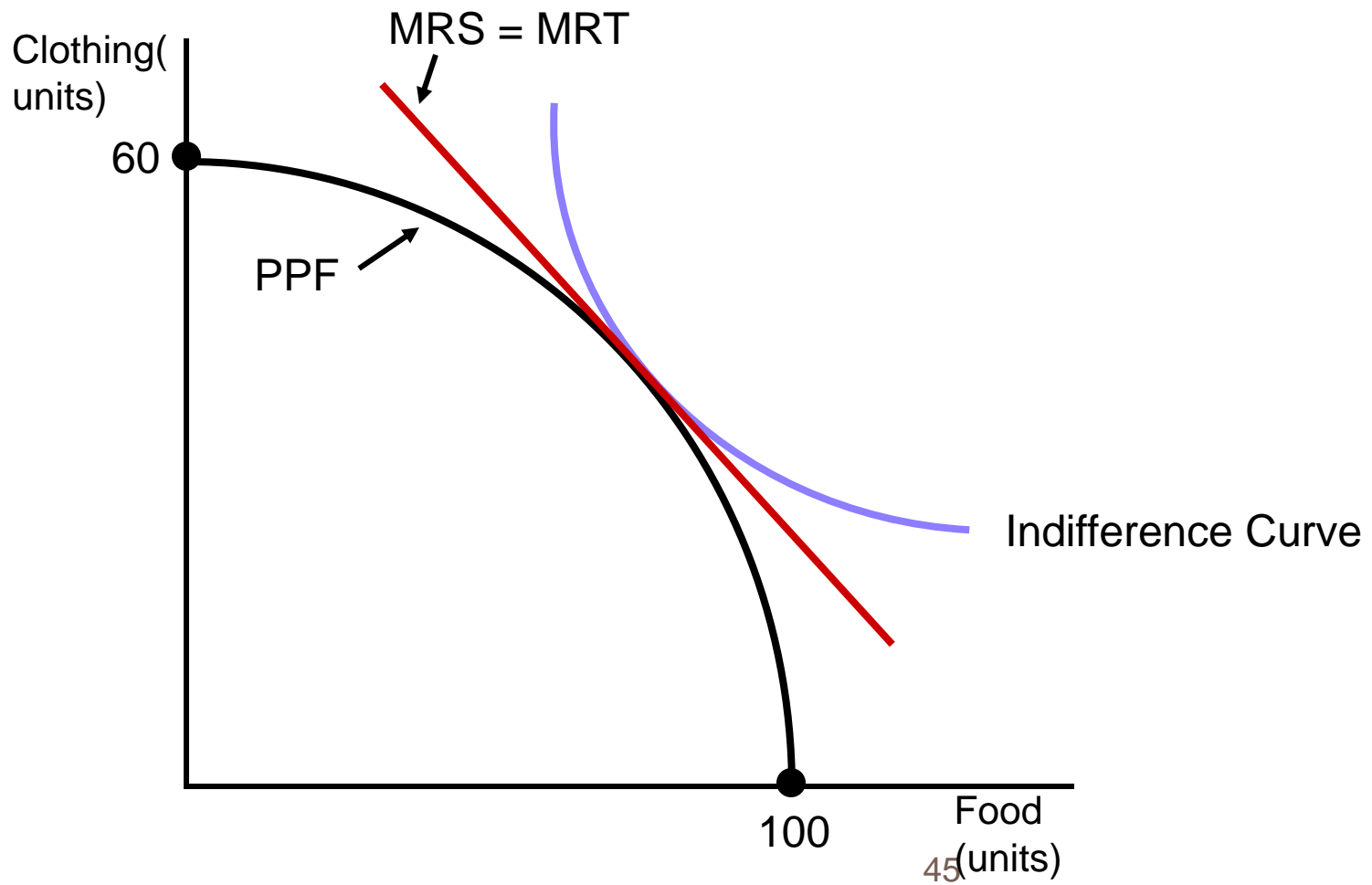


Marginal Rate of Transformation

- Can also describe in terms of costs
 - When producing at OF the MC of food is very low and MC of clothing is very high
 - When MRT is low, so is the ratio of the MC of producing food to clothing
 - Slope of PPF measures the MC of producing one good relative to the MC of producing the other

$$MRT = \frac{MC_F}{MC_C}$$

Output Efficiency

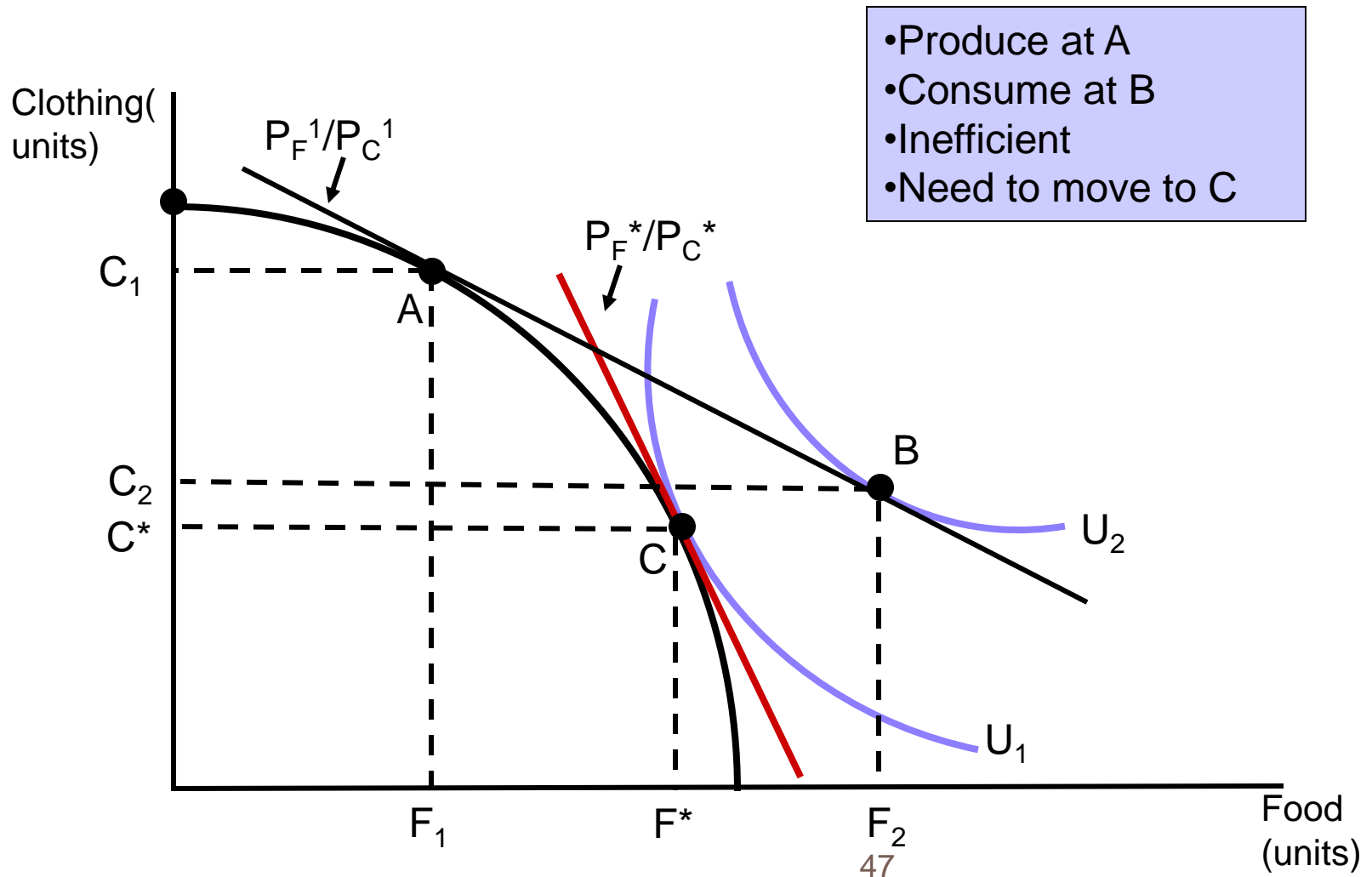


Efficiency in Output Markets

- For perfectly competitive markets, all consumers allocate their budgets so their MRS between two goods are equal to the ratio of prices
- Profit maximizing firms produce output to the point where price is equal to MC
- MRT is equal to the MRS

$$MRT = \frac{MC_F}{MC_C} = \frac{P_F}{P_C} = MRS$$

Efficiency in Output Markets



The Gains from Free Trade 자유무역의 이득

- We have showed gains from trade in an Edgeworth box, but what about gains from trade with two countries where one has the comparative advantage
 - ▣ A country has a comparative advantage over another country in the production of a good if the first country can produce the good at a lower opportunity cost than the other country

The Gains from Free Trade

- Gains from trade with two countries where one has the comparative advantage
 - ▣ A country has a comparative advantage over another country in the production of a good if the first country can produce the good at a lower opportunity cost than the other country
- EX: Two countries producing two goods
 - ▣ Holland and Italy
 - ▣ Cheese and Wine
 - ▣ Holland has comparative advantage in cheese production
 - ▣ Italy as comparative advantage in wine production
 - ▣ Trade is good for both countries

The Gains from Free Trade

Hours of Labor Required to Produce Cheese and Wine		
	Cheese (1 LB)	Wine (1 GAL)
Holland	1	2
Italy	6	3

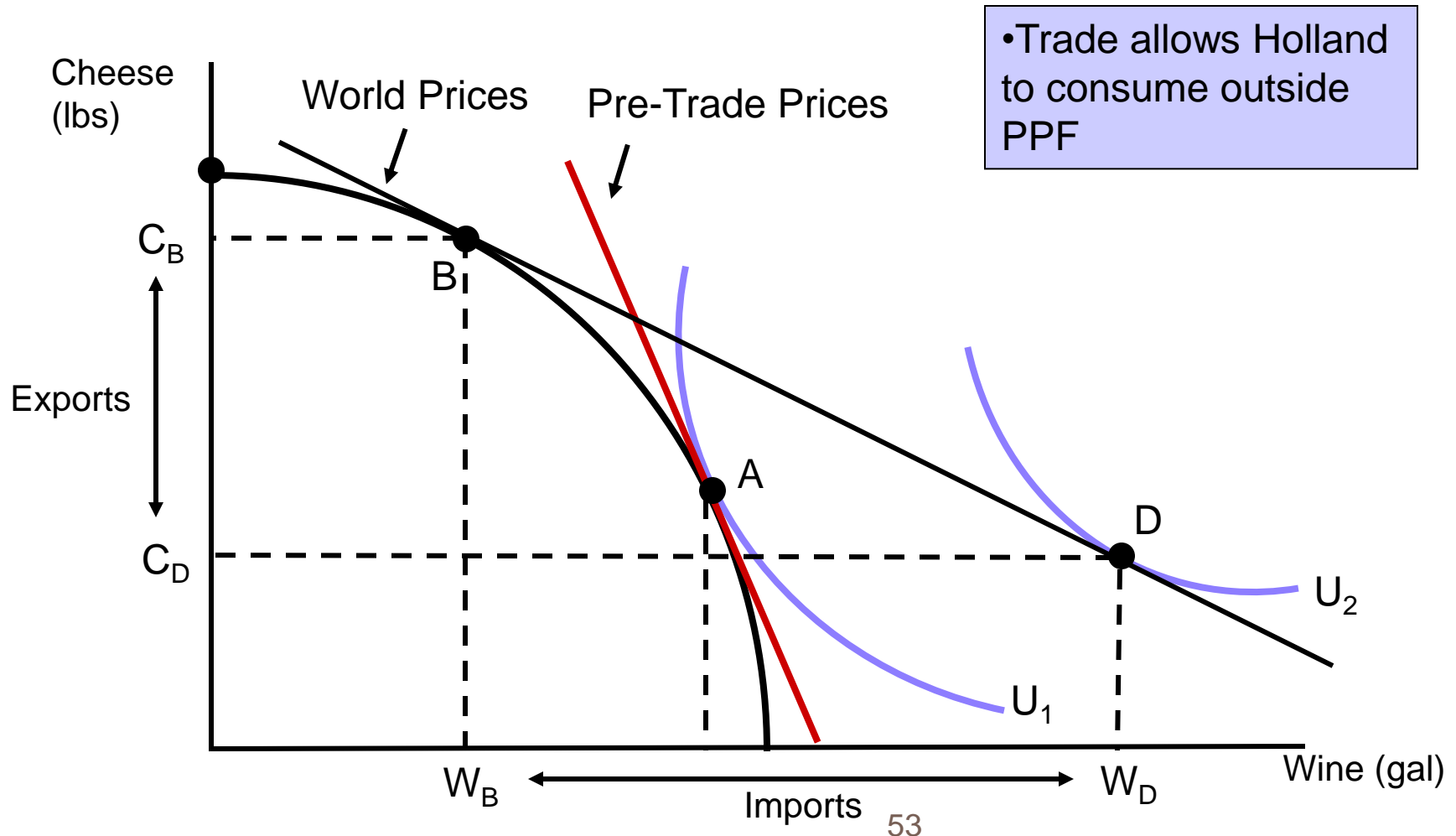
The Gains from Free Trade

- When there is comparative advantage, free trade allows the country to consume outside their PPF
- Before trade
 - ▣ Produces at A on indifference curve U_1 where MRT and pre-trade price ratio is 2
 - ▣ Holland would want to export 2 pounds of cheese for 1 gallon of wine

The Gains from Free Trade

- After trade
 - ▣ Suppose they choose to trade 1 gallon of wine for 1 pound of cheese
 - ▣ Holland will produce at the point of tangency on the 1/1 price line and PPF – point B
 - ▣ Consumption will occur at D, on a higher indifference curve U_2 tangent to the trade price line

The Gains from Trade



Overview – Efficiency of Competitive Markets

1. Efficiency in Exchange

- ▣ $MRS_{FC}^J = MRS_{FC}^K$
- ▣ $MRS_{FC}^J = P_F/P_C = MRS_{FC}^K$

2. Efficiency in the use of inputs in production

- ▣ $MRTS_{LK}^F = MRTS_{LK}^C$
- ▣ $MRTS_{LK}^F = w/r = MRTS_{LK}^C$