

# Chapter 16

## General Equilibrium and Economic Efficiency

# Topics to be Discussed

---

---

- General Equilibrium Analysis
- Efficiency in Exchange
- Equity and Efficiency
- Efficiency in Production



# Topics to be Discussed

---

---

- The Gains from Free Trade
- On Overview--The Efficiency of Competitive Markets
- Why Markets Fail



# General Equilibrium Analysis

---

---

- Partial equilibrium analysis presumes that activity in one market is independent of other markets.



# General Equilibrium Analysis

---

---

- General equilibrium analysis determines the prices and quantity in all markets simultaneously and takes the *feedback effect* into account.



# General Equilibrium Analysis

---

---

- A **feedback effect** is a price or quantity adjustment in one market caused by price and quantity adjustments in related markets.



# General Equilibrium Analysis

---

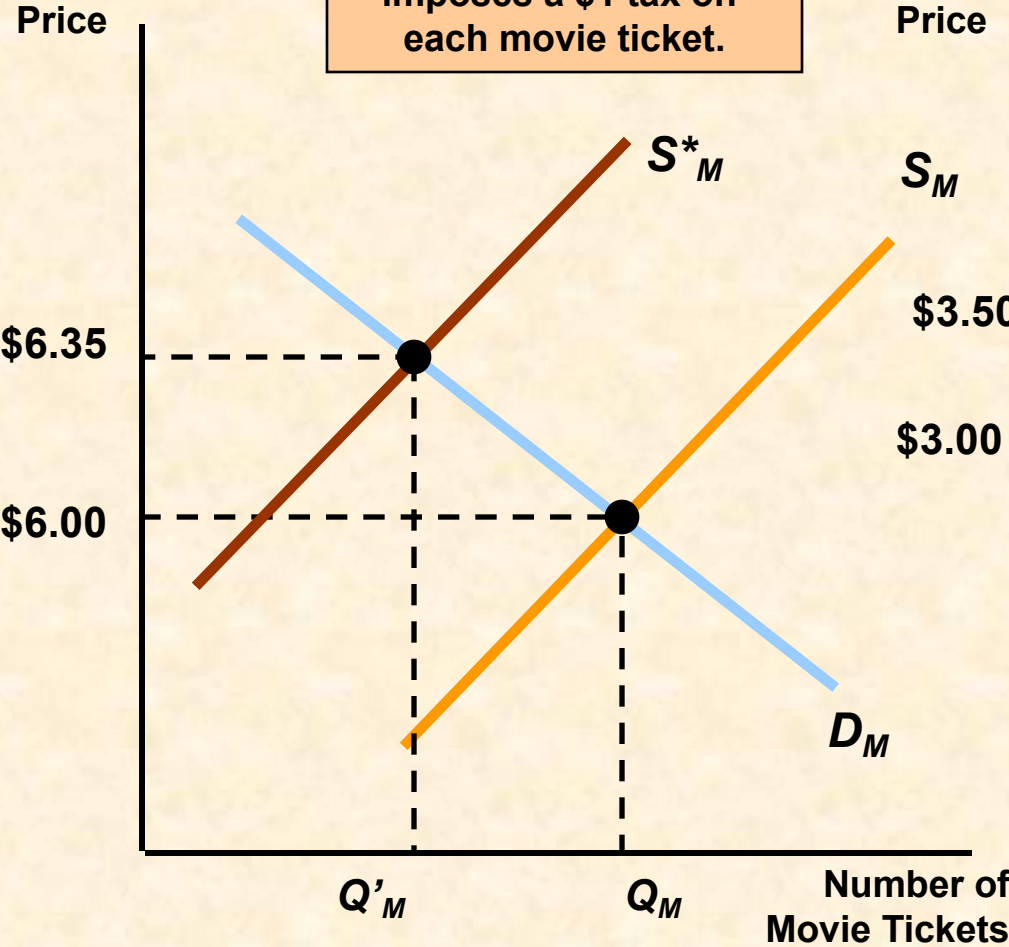
---

- Two Interdependent Markets--Moving to General Equilibrium
  - Scenario
    - ◆ The competitive markets of:
      - Videocassette rentals
      - Movie theater tickets

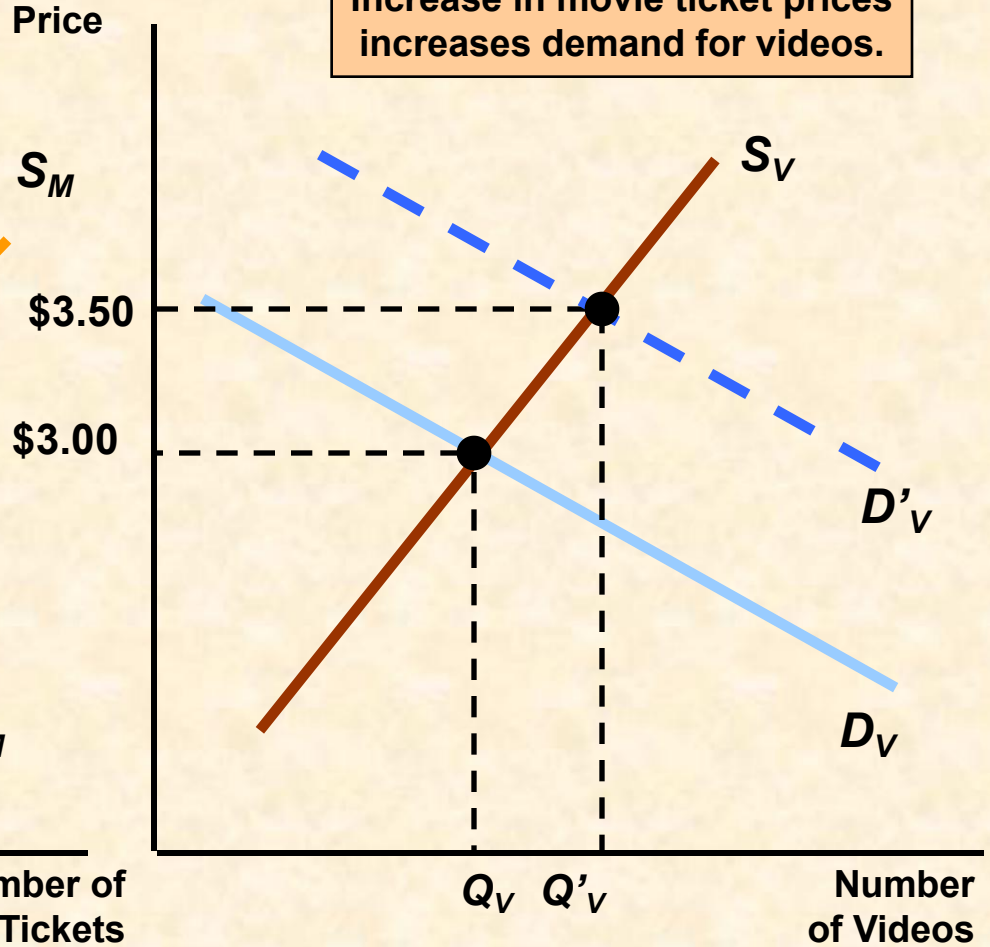


# Two Interdependent Markets: Movie Tickets and Videocassette Rentals

Assume the government imposes a \$1 tax on each movie ticket.



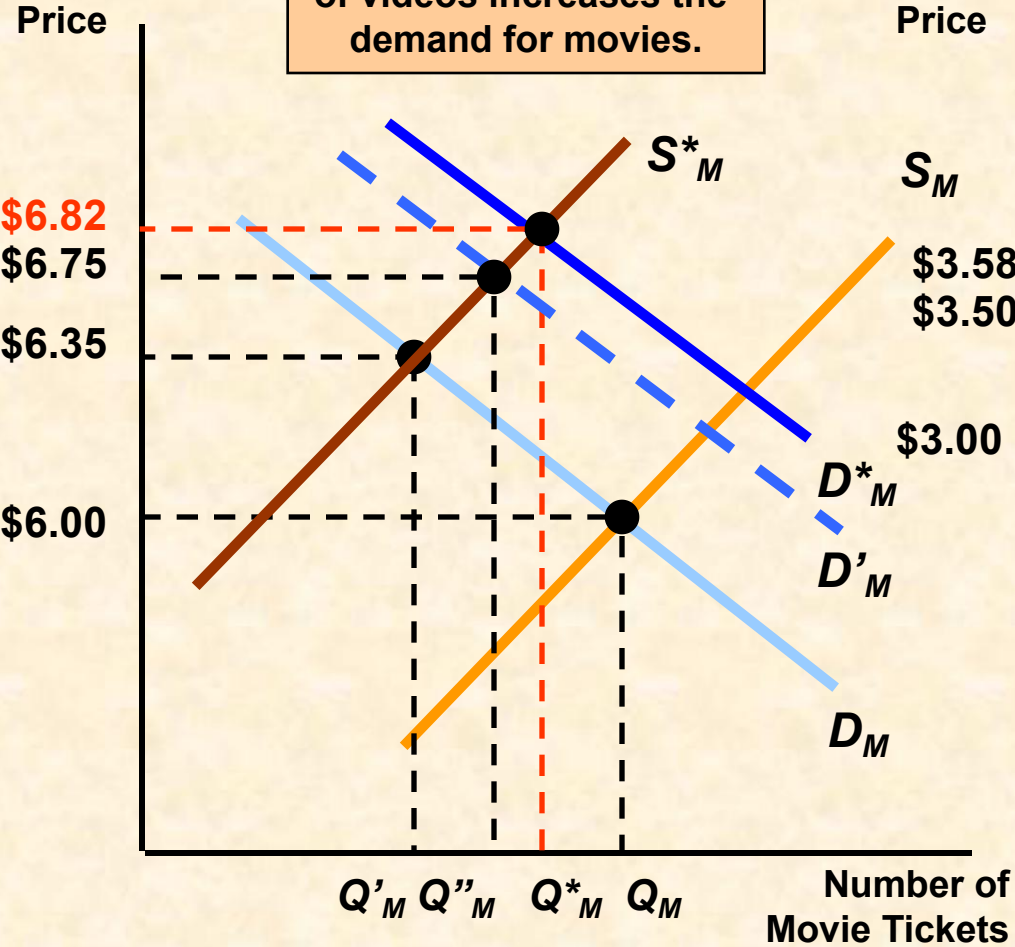
General Equilibrium Analysis:  
Increase in movie ticket prices  
increases demand for videos.



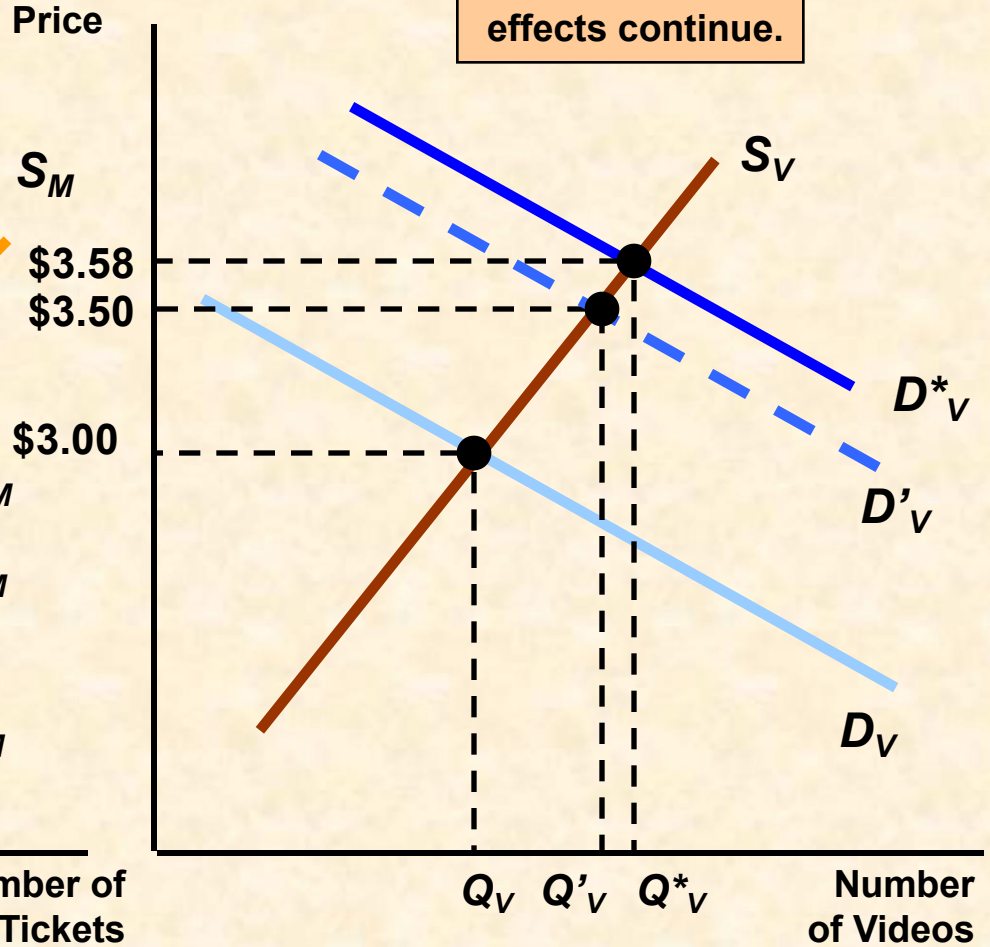


# Two Interdependent Markets: Movie Tickets and Videocassette Rentals

The increase in the price of videos increases the demand for movies.



The Feedback effects continue.



# Two Interdependent Markets: Movie Tickets and Videocassette Rentals

---

---

## ■ Observation

- Without considering the feedback effect with general equilibrium, the impact of the tax would have been underestimated
- This is an important consideration for policy makers.



# Two Interdependent Markets: Movie Tickets and Videocassette Rentals

---

---

## ■ Questions

- What would be the feedback effect of a tax increase on one of two complementary goods?
- What are the policy implications of using a partial equilibrium analysis compared to a general equilibrium in this scenario?



# The Interdependence of International Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Brazil and the United States export soybeans and are, therefore, interdependent.
- Brazil limited exports in the late 1960's and early 1970's.
- Eventually the export controls were to be removed, and Brazilian exports were expected to increase.



# The Interdependence of International Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

## ■ Partial Analysis

- Brazilian domestic soybean price will fall and domestic demand for soybean products would increase.



# The Interdependence of International Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

## ■ General Analysis

- In the U.S. the price of soybeans and output would increase; U.S. exports would increase and Brazilian exports would fall (even after regulations ended).



# Efficiency in Exchange

- Exchange increases efficiency until no one can be made better off without making someone else worse off (Pareto efficiency).
- The Advantages of Trade
  - Trade between two parties is mutually beneficial.



# Efficiency in Exchange

## ■ Assumptions

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





# The Advantage of Trade

Individual	Initial Allocation	Trade	Final Allocation
James	7F, 1C	-1F, +1C	6F, 2C
Karen	3F, 5C	+1F, -1C	4F, 4C

**Karen's MRS of food for clothing is 3.  
James's MRS of food for clothing is 1/2.  
Karen and James are willing to trade: Karen trades 1C for 1F. When the MRS is not equal, there is gain from trade. The economically efficient allocation occurs when the MRS is equal.**

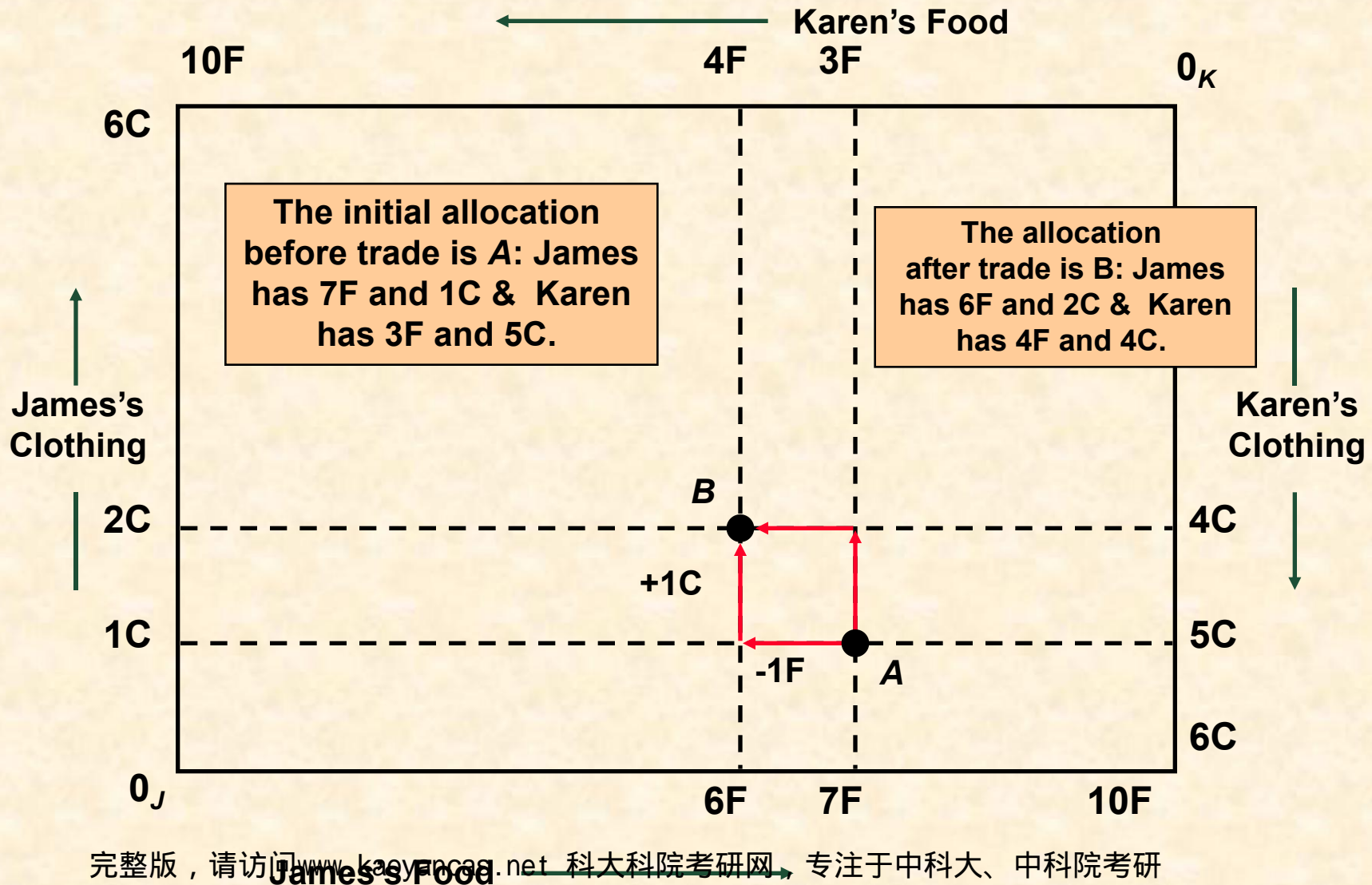


# Efficiency in Exchange

- The Edgeworth Box Diagram
  - Which trades can occur and which allocation will be efficient can be illustrated using a diagram called an **Edgeworth Box**.



# Exchange in an Edgeworth Box



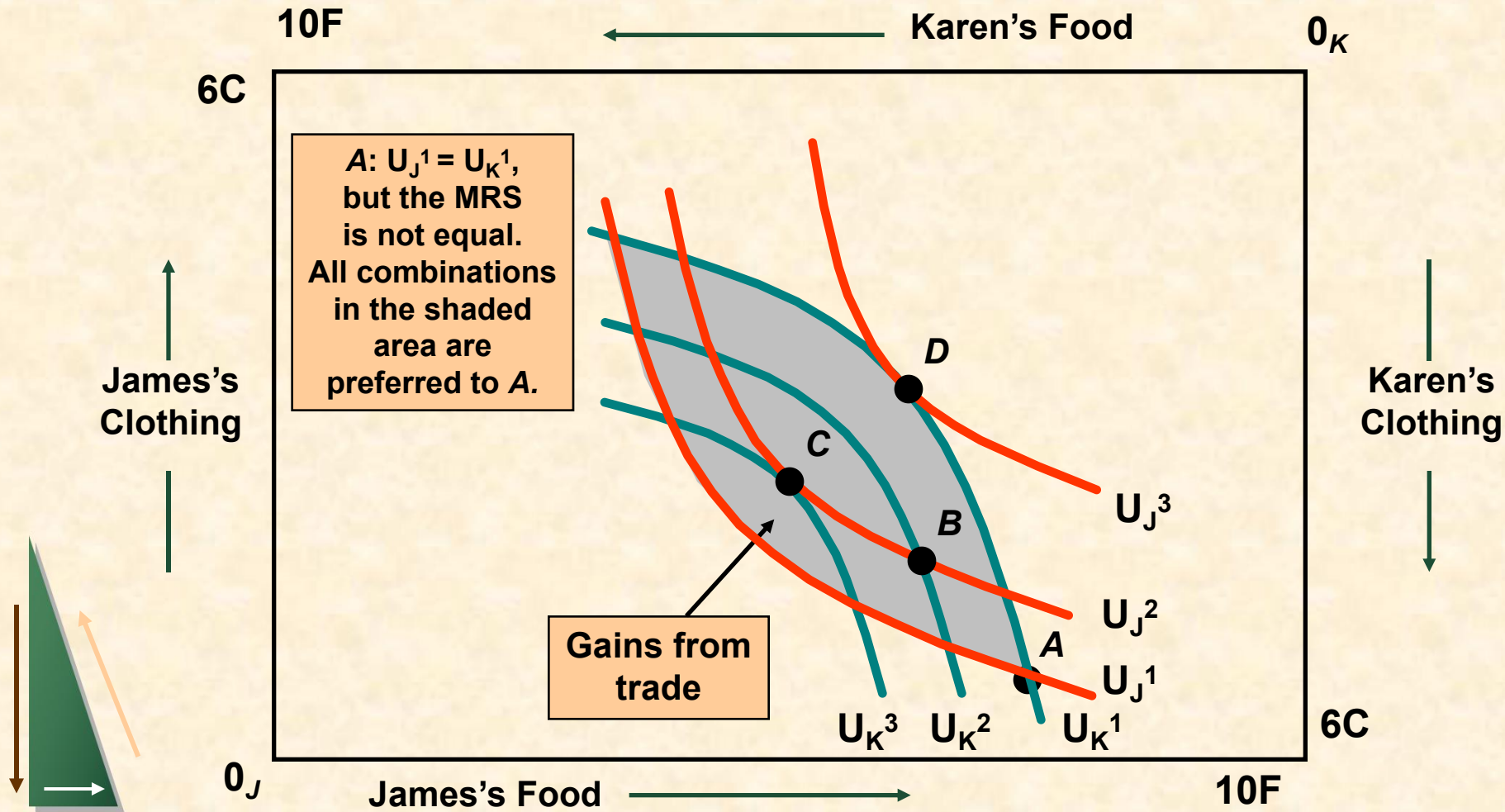
# Efficiency in Exchange

## ■ Efficient Allocations

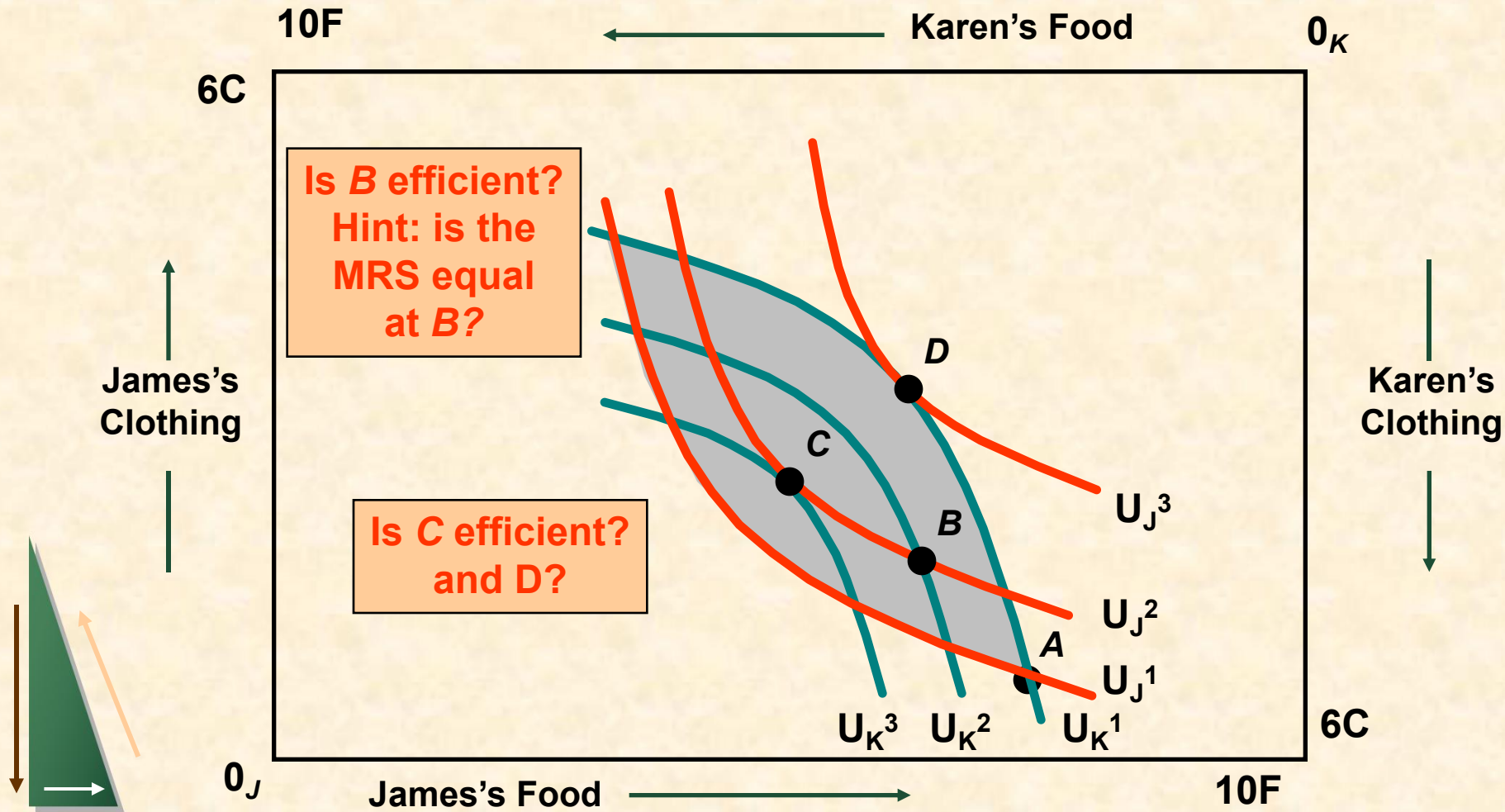
- If James's and Karen's MRS are the same at  $B$  the allocation is efficient.
  - ◆ This depends on the shape of their indifference curves.



# Efficiency in Exchange



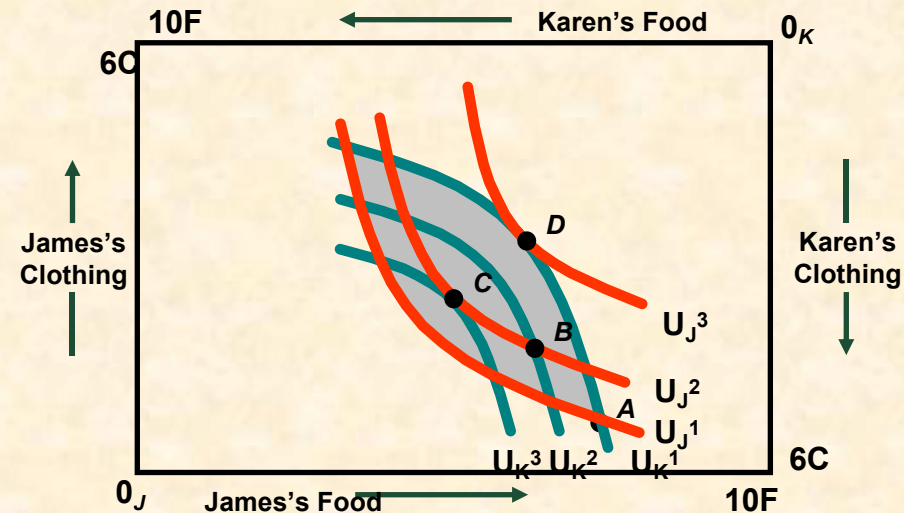
# Efficiency in Exchange



# Efficiency in Exchange

## ■ Efficient Allocations

- 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

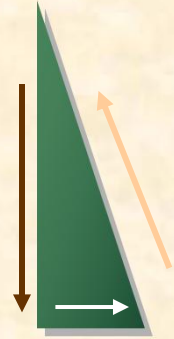
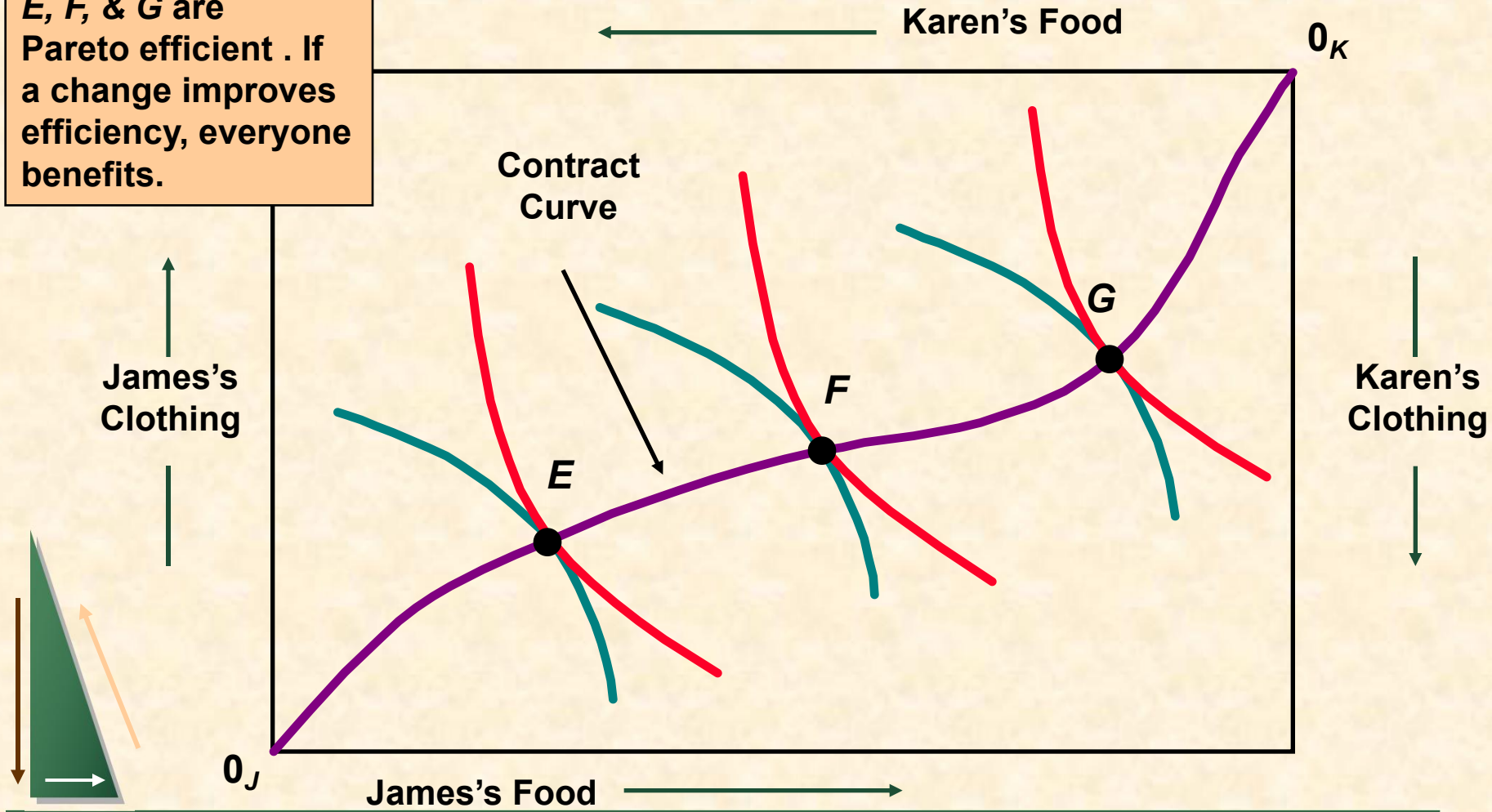
- To find *all possible efficient allocations of food and clothing* between Karen and James, we would look for all points of tangency between each of their indifference curves.





# The Contract Curve

*E, F, & G* are Pareto efficient. If a change improves efficiency, everyone benefits.



# Efficiency in Exchange

## ■ Observations

- 1) All points of tangency between the indifference curves are efficient.
- 2) The contract curve shows all allocations that are *Pareto efficient*.
  - ◆ *Pareto efficient* allocation occurs when trade will make someone worse off.



# Efficiency in Exchange

- **Application:** The policy implication of Pareto efficiency when removing import quotas:

1) Remove quotas

- ◆ Consumers gain
- ◆ Some workers lose

2) Subsidies to the workers that cost less than the gain to consumers



# 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.

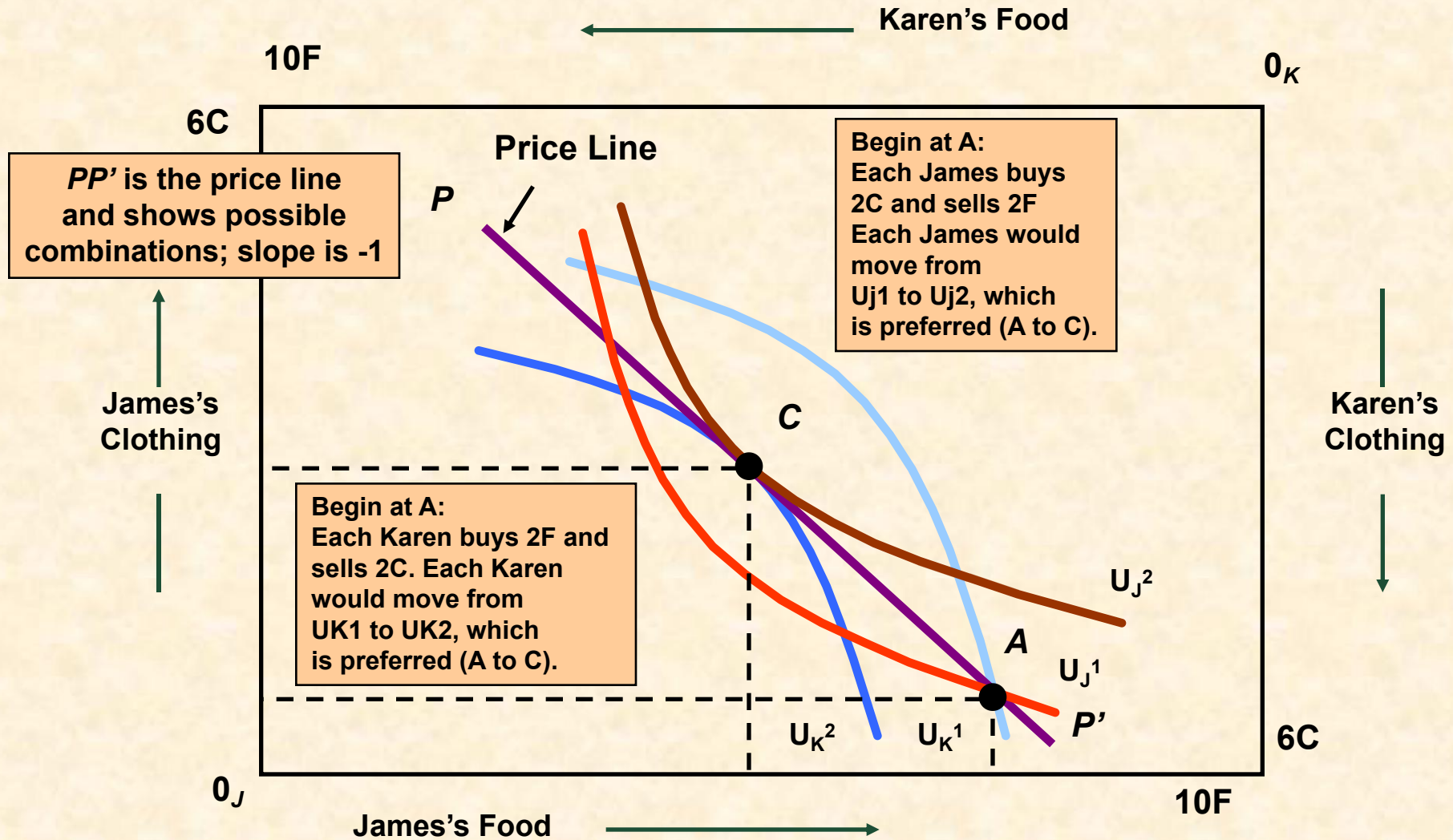


# Efficiency in Exchange

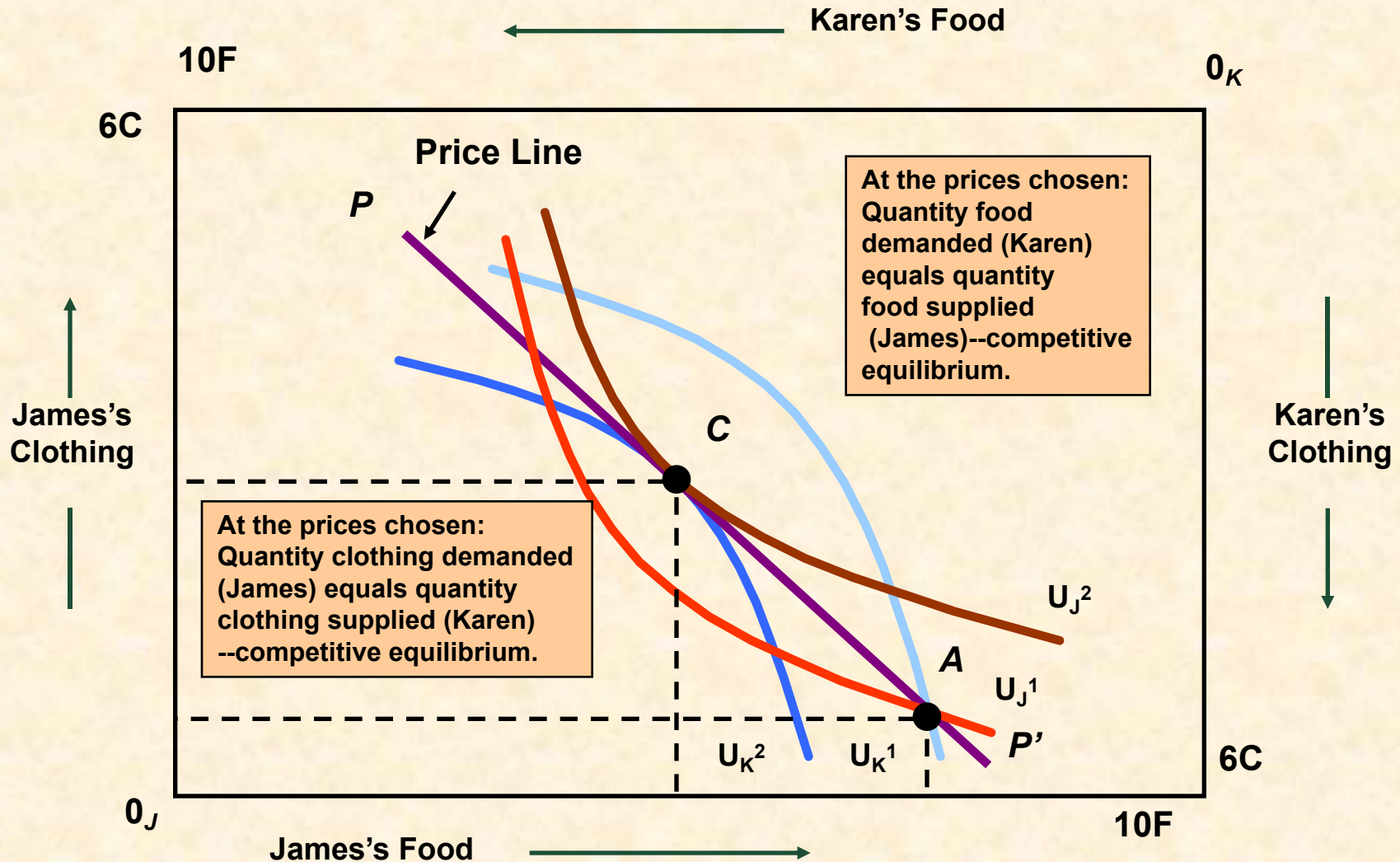
- Consumer Equilibrium in a Competitive Market
  - There are many Jameses and Karens.
  - They are price takers
  - Price of food and clothing = 1 (relative prices will determine trade)



# Competitive Equilibrium



# Competitive Equilibrium



# Efficiency in Exchange

## ■ Scenario

- $P_F$  and  $P_C = 3$
- James's MRS of clothing for food is  $1/2$ .
- Karen's MRS of clothing for food is 3.
- James will not trade.
- Karen will want to trade.
- The market is in disequilibrium.
  - ◆ Surplus of clothing
  - ◆ Shortage of food





# Efficiency in Exchange

## ■ Questions

- How would the market reach equilibrium?
- How does the outcome from the exchange with many people differ from the exchange between two people?

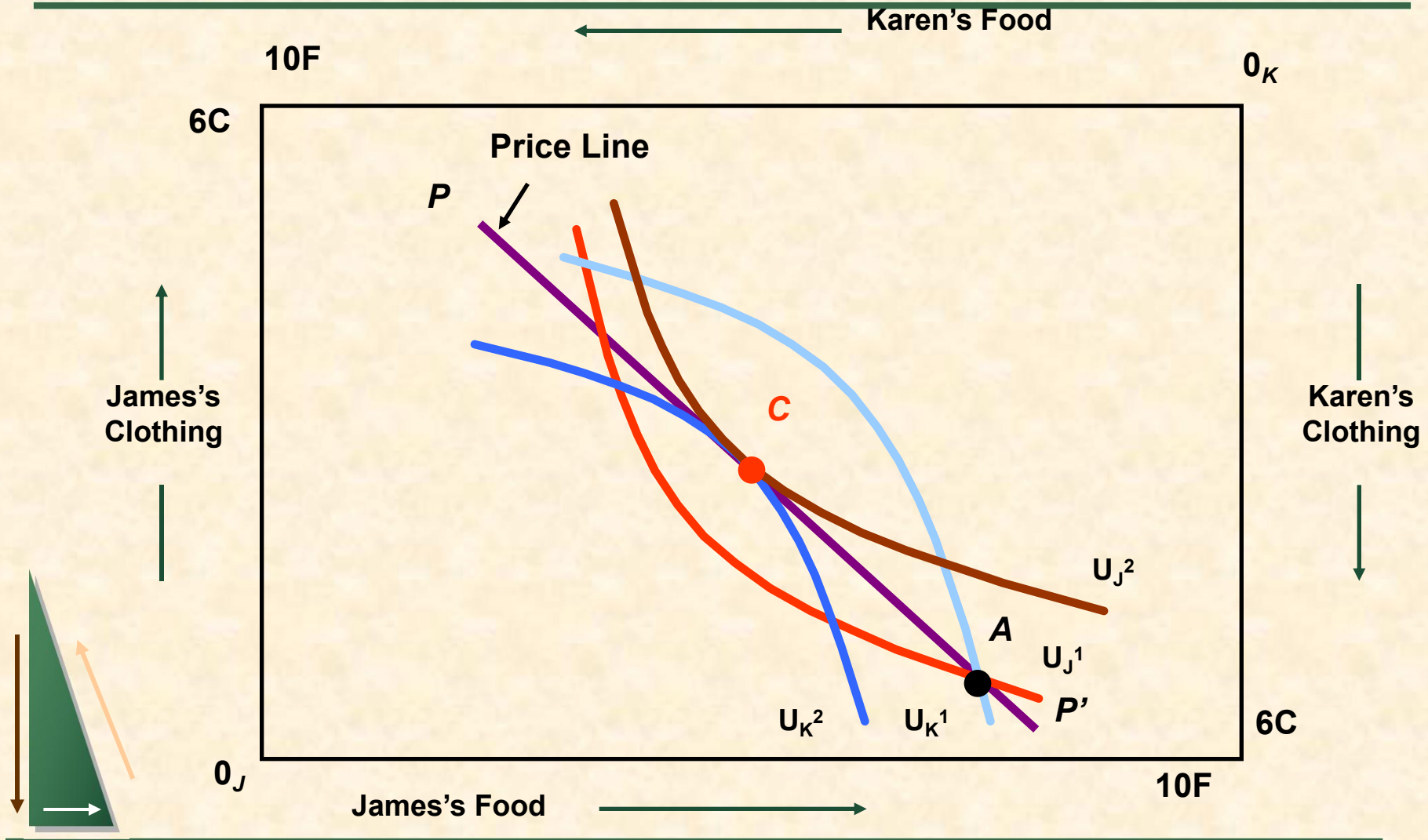


# Efficiency in Exchange

- The Economic Efficiency of Competitive Markets
  - It can be seen at point C (as shown on the next slide) that *the allocation in a competitive equilibrium is economically efficient.*



# Competitive Equilibrium



# Efficiency in Exchange

## ■ Observations concerning C:

- 1) Since the two indifference curves are tangent, the competitive equilibrium allocation is efficient.
- 2) The  $MRS_{CF}$  is equal to the ratio of the prices, or  $MRS^J_{FC} = P_C/P_F = MRS^K_{FC}$ .



# Efficiency in Exchange

- Observations concerning C:
  - 3) If the indifference curves were not tangent, trade would occur.
  - 4) The competitive equilibrium is achieved without intervention.



# Efficiency in Exchange

## ■ Observations concerning C:

- 5) In a competitive marketplace, all mutually beneficial trades will be completed and the resulting equilibrium allocation of resources will be economically efficient (the *first theorem of welfare economics*)



# Efficiency in Exchange

---

---

## ■ Policy Issues

- What is the role of government?



# Equity and Efficiency

---

---

- Is an efficient allocation also an equitable allocation?
  - Economists and others disagree about how to define and quantify equity.



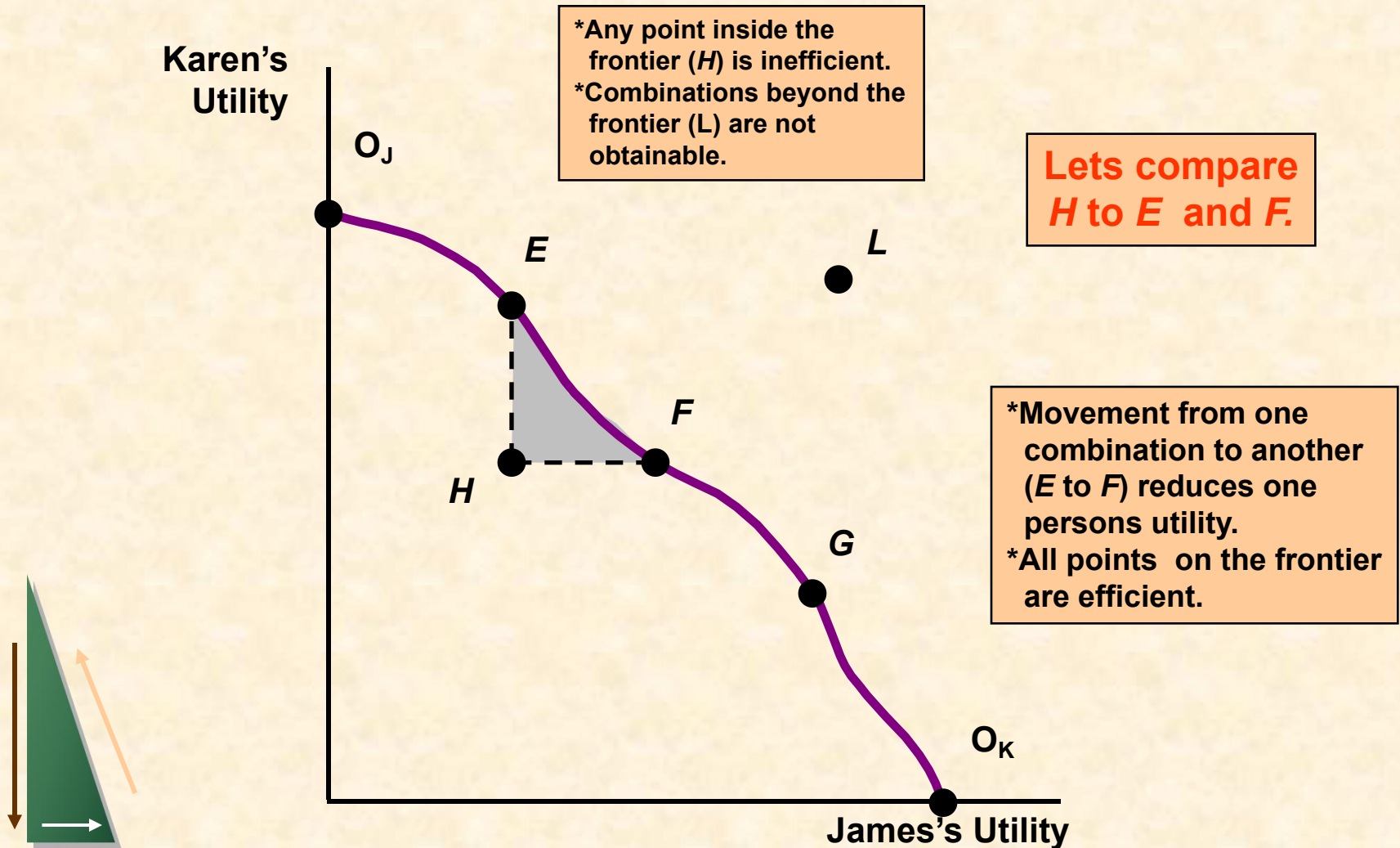


# Equity and Efficiency

- The Utility Possibilities Frontier
  - Indicates
    - ◆ the level of satisfaction that each of two people achieve when they have traded to an efficient outcome on the contract curve.
    - ◆ all allocations that are efficient.



# Utility Possibilities Frontier

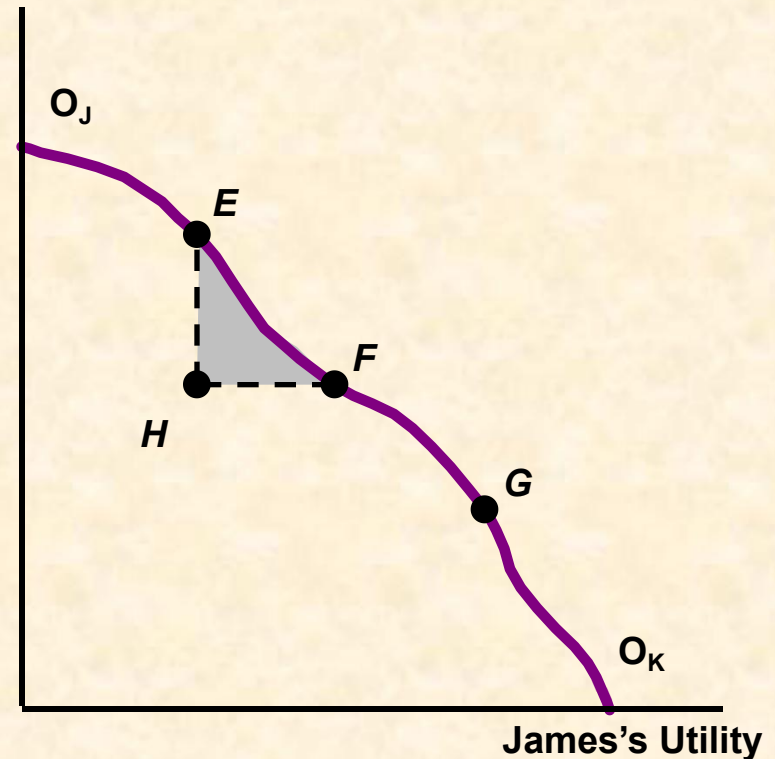


# Equity and Efficiency

- $E$  &  $F$  are efficient.
- Compared to  $H$ ,  $E$  &  $F$  make one person better off without making the other worse off.



Karen's  
Utility



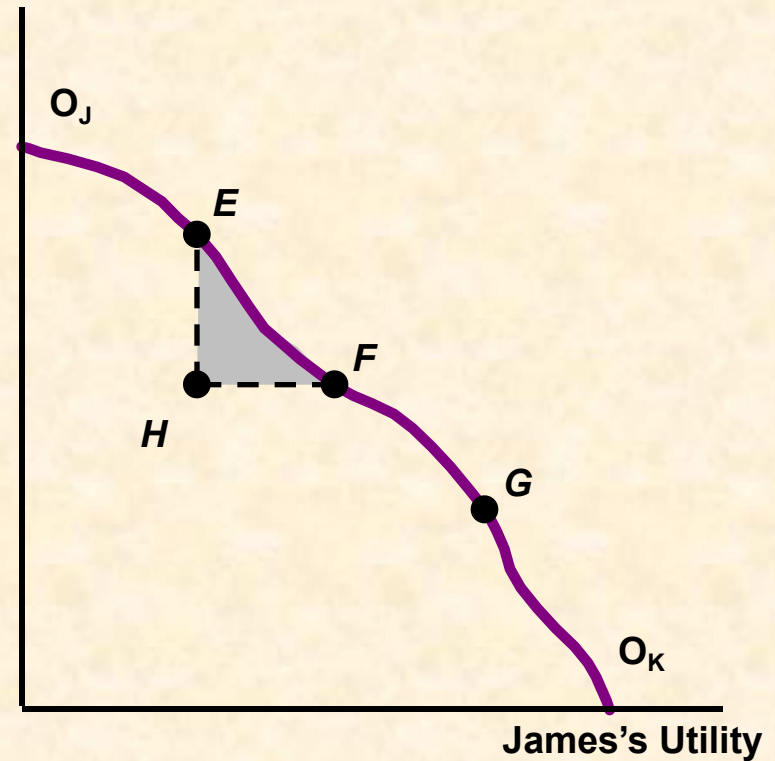
# Equity and Efficiency

## ■ Is $H$ equitable?

- Assume the only choices are  $H$  &  $G$
- Is  $G$  more equitable? It depends on perspective.
  - ◆ At  $G$  James total utility > Karen's total utility



Karen's  
Utility



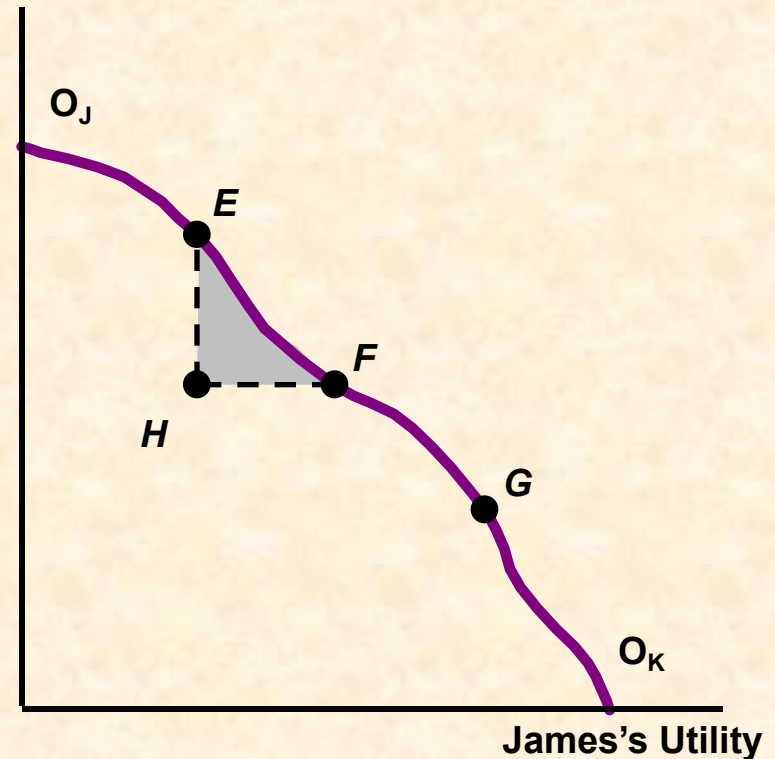
# Equity and Efficiency

## ■ Is $H$ equitable?

- Assume the only choices are  $H$  &  $G$
- Is  $G$  more equitable? It depends on perspective.
  - ◆  $H$  may be more equitable because the distribution is more equal, therefore, an inefficient allocation may be more equitable.



Karen's  
Utility



# Equity and Efficiency

---

---

- Social Welfare Functions
  - Used to describe the particular weights that are applied to each individual's utility in determining what is socially desirable



# Four Views of Equity

---

---

## ■ Egalitarian

- All members of society receive equal amounts of goods

## ■ Rawlsian

- Maximize the utility of the least-well-off person



# Four Views of Equity

---

---

## ■ Utilitarian

- Maximize the total utility of all members of society

## ■ Market-oriented

- The market outcome is the most equitable





# Equity and Efficiency

---

---

- The Social Welfare Function and Equity
  - Equity is dependent on a normative priority ranging from Egalitarian to Market-orientation.



# Equity and Efficiency

---

---

- Equity and Perfect Competition
  - A competitive equilibrium leads to a Pareto efficient outcome that may or may not be equitable.

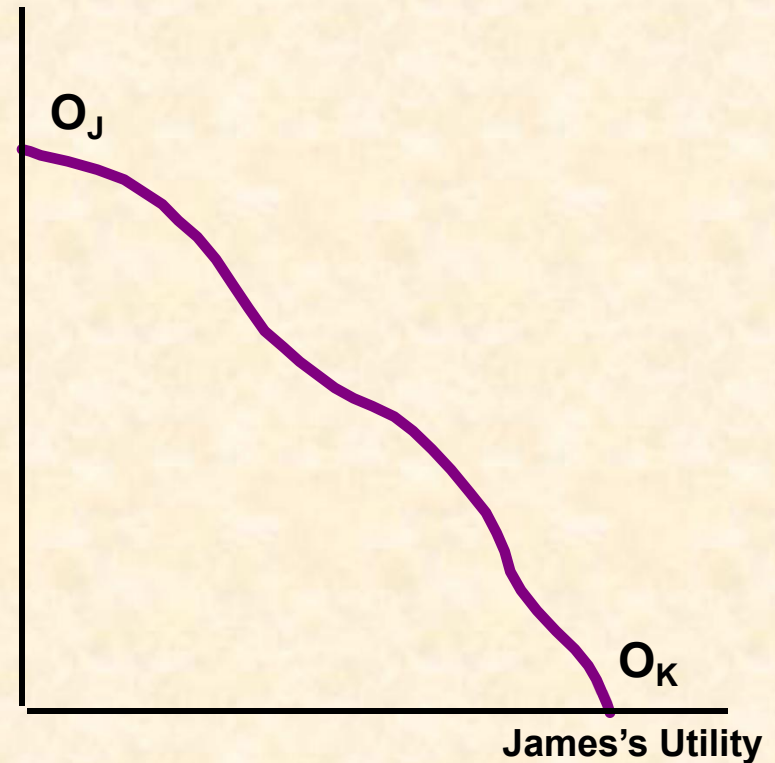


# Equity and Efficiency

- Points on the frontier are Pareto efficient.
  - $O_J$  &  $O_K$  are perfect unequal distributions and Pareto efficient.
  - To achieve equity (more equal distribution) must the allocation be efficient?



Karen's  
Utility



# Equity and Efficiency

- Second Theorem of Welfare Economics
  - If individual preferences are convex, then every efficient allocation is a competitive equilibrium from some initial allocation of goods.



# Equity and Efficiency

---

---

- Second Theorem of Welfare Economics
  - Consider the cost of programs to redistribute income and the trade off between equity and efficiency.



# Efficiency in Production

---

---

## ■ Assume

- Fixed total supplies of two inputs; labor and capital
- Produce two products; food and clothing
- Many people own and sell inputs for income
- Income is distributed between food and clothing



# Efficiency in Production

## ■ Observations

- Linkage between supply and demand (income and expenditures)
- Changes in the price of one input triggers changes in income and demand which establishes a feedback effect.
- Use general equilibrium analysis with feedback effects



# Efficiency in Production

---

---

- Production in the Edgeworth Box
  - The Edgeworth box can be used to measure inputs to the production process.





# Efficiency in Production

## ■ Production in the Edgeworth Box

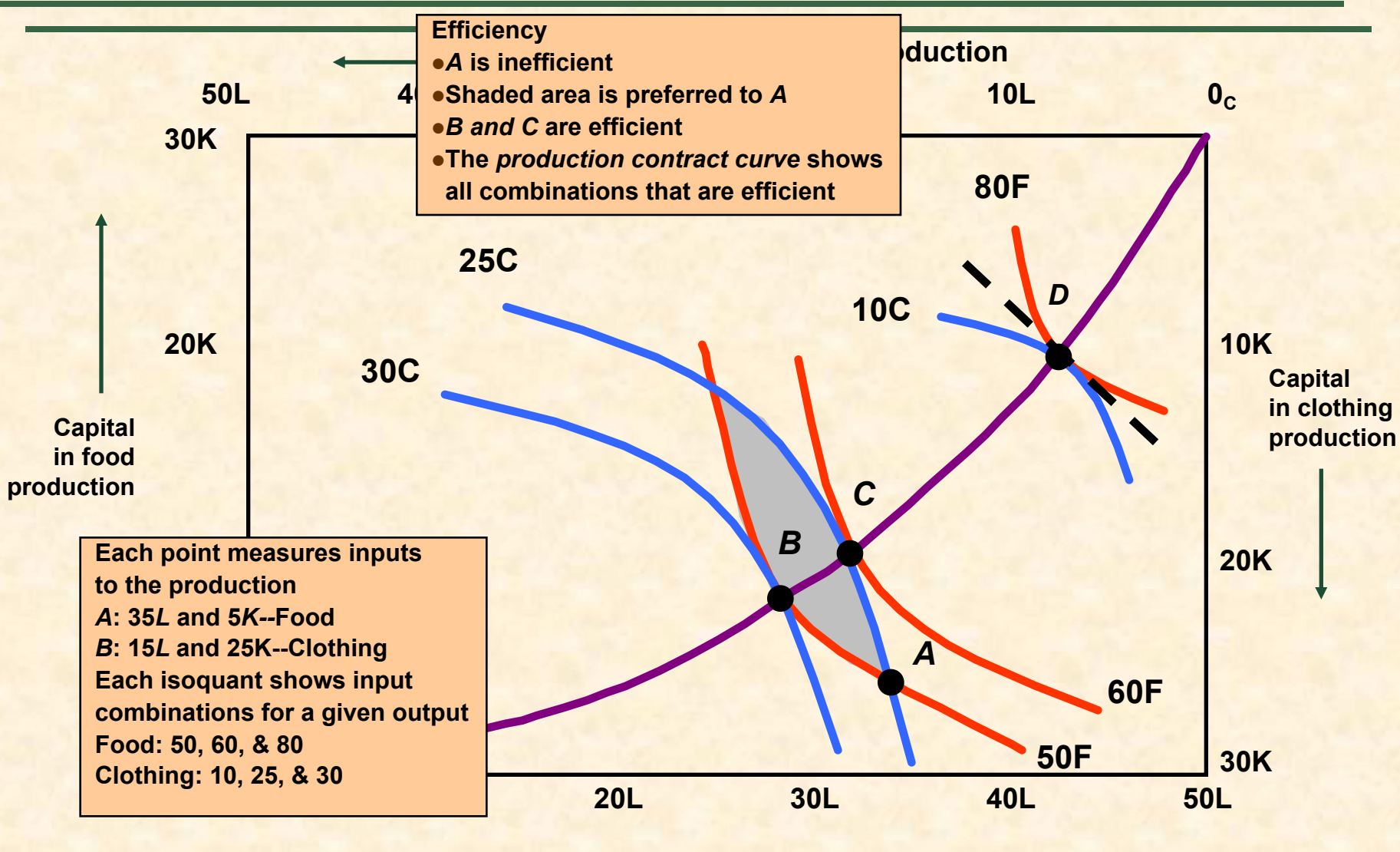
- Each axis measures the quantity of an input
  - ◆ Horizontal: Labor, 50 hours
  - ◆ Vertical: Capital, 30 hours
- Origins measure output
  - ◆  $O_F$  = Food
  - ◆  $O_C$  = Clothing



# Efficiency in Production

**Efficiency**

- A is inefficient
- Shaded area is preferred to A
- B and C are efficient
- The *production contract curve* shows all combinations that are efficient



Each point measures inputs to the production

A: 35L and 5K--Food  
B: 15L and 25K--Clothing

Each isoquant shows input combinations for a given output

Food: 50, 60, & 80  
Clothing: 10, 25, & 30

# Efficiency in Production

---

---

- Producer Equilibrium in a Competitive Input Market
  - Competitive markets create a point of efficient production.



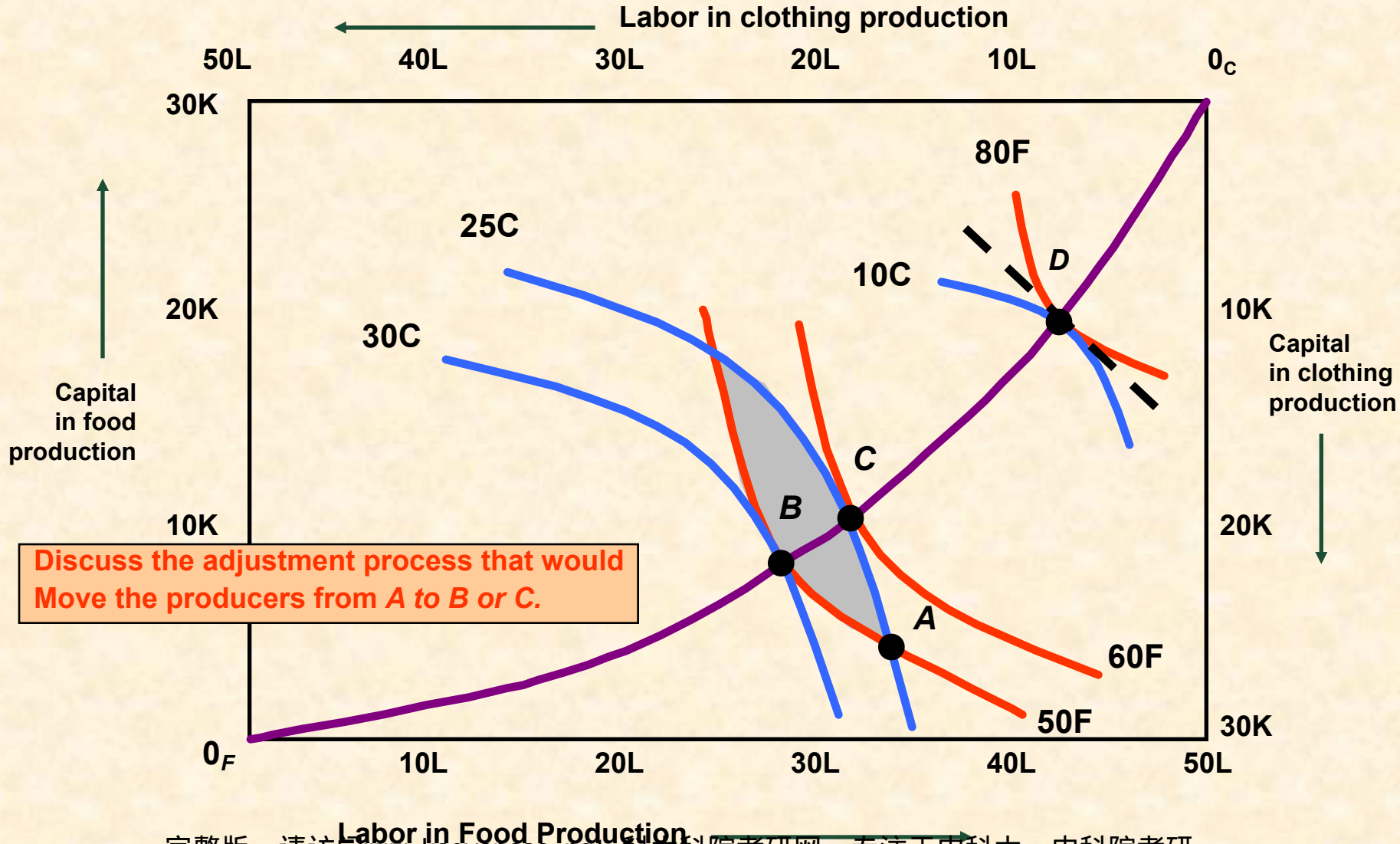
# Efficiency in Production

## ■ Competitive Market Observations

- The wage rate ( $w$ ) and the price of capital ( $r$ ) will be the same for all industries.
- Minimize production cost
  - ◆  $MP_L/MP_K = w/r$
  - ◆  $w/r = MRTS_{LK}$
- $MRTS = \text{slope of the isoquant}$
- Competitive equilibrium is on the production contract curve.
- Competitive equilibrium is efficient.



# Efficiency in Production



# Efficiency in Production

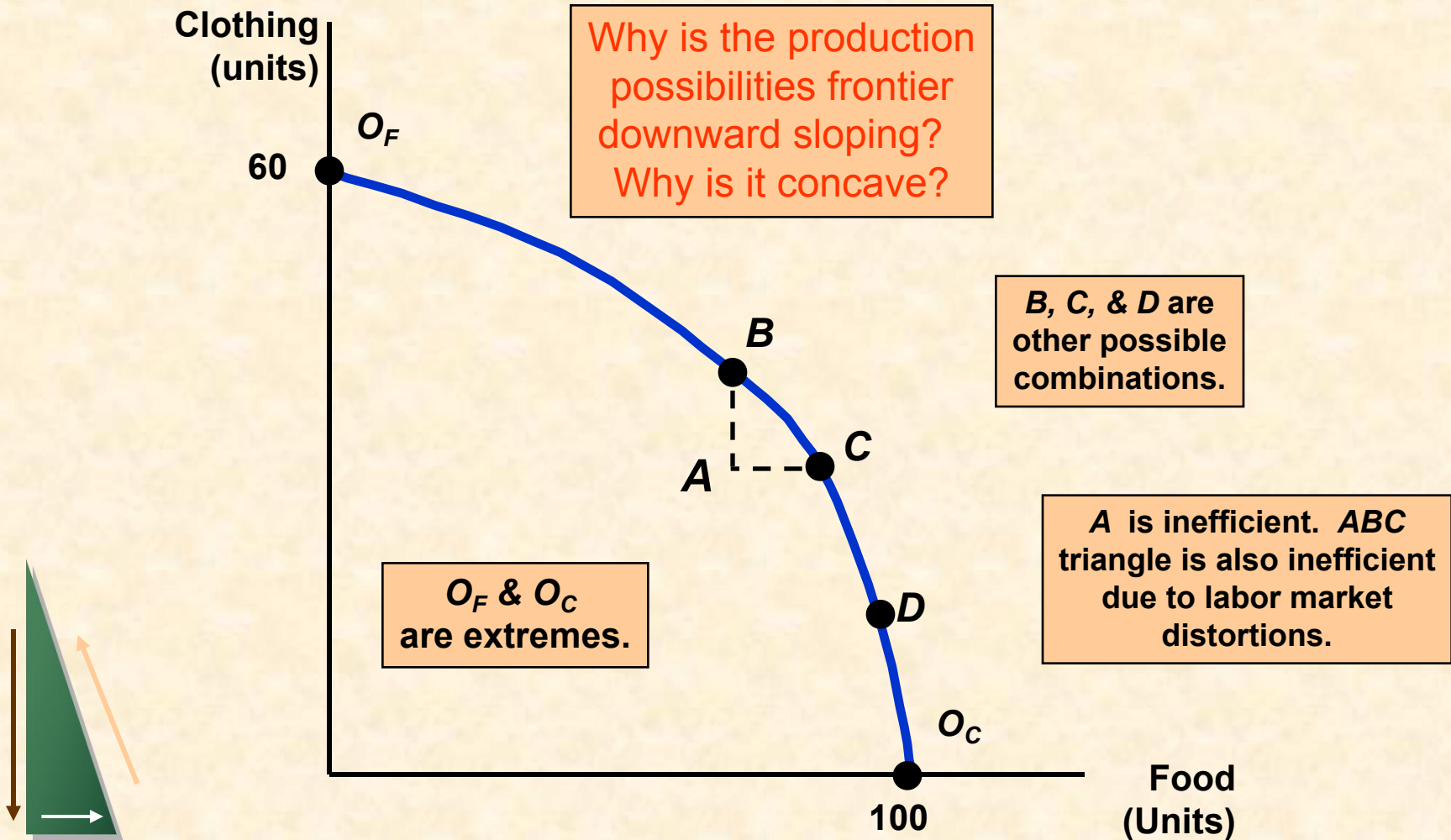
---

---

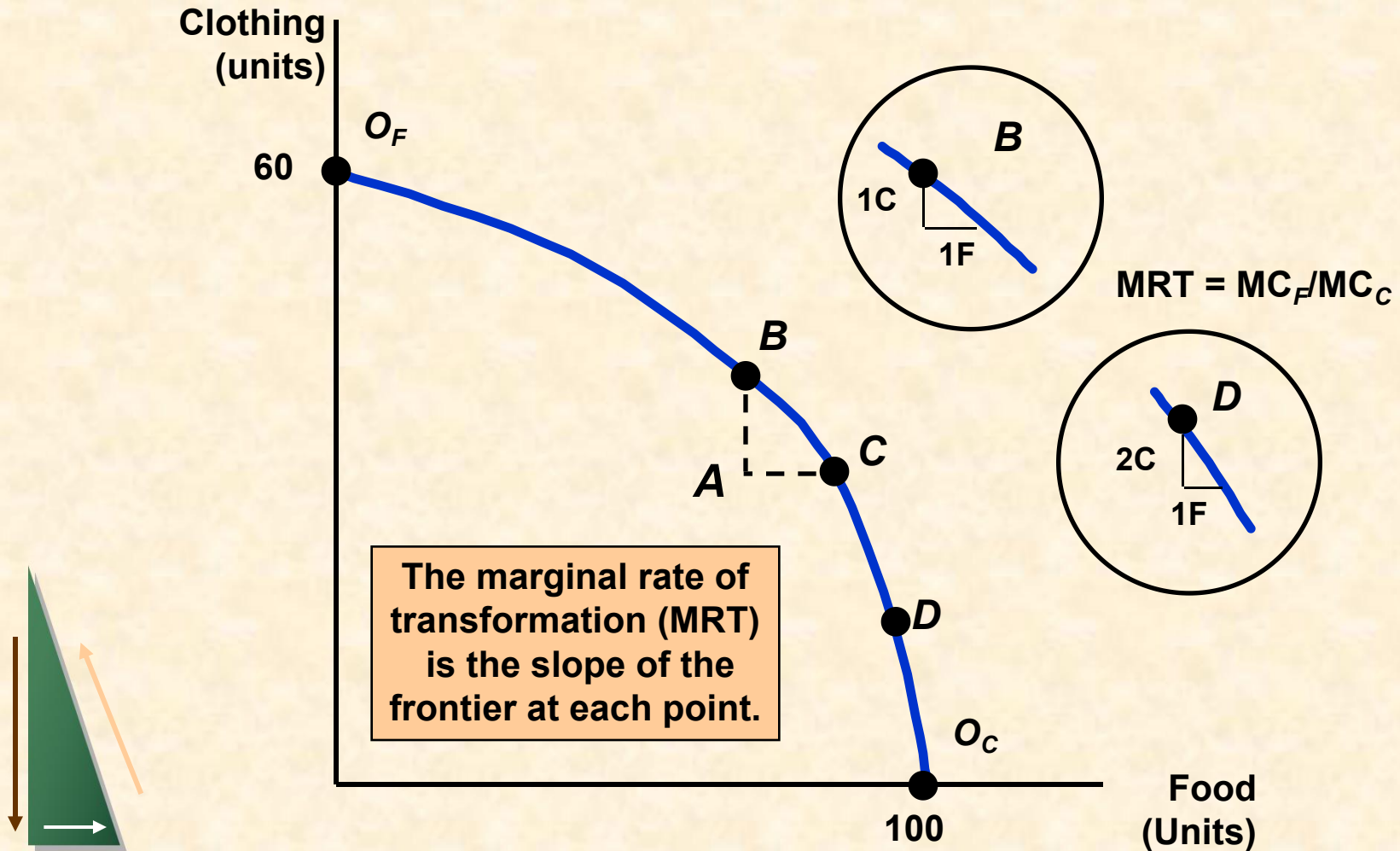
- The Production Possibilities Frontier
  - Shows the various combinations of food and clothing that can be produced with fixed inputs of labor and capital.
  - Derived from the contract curve



# Production Possibilities Frontier



# Production Possibilities Frontier





# Efficiency in Production

## ■ Output Efficiency

- Goods must be produced at minimum cost *and must be produced in combinations that match people's willingness to pay for them.*
  - ◆ Efficient output and Pareto efficient allocation
  - ◆ Occurs where  $MRS = MRT$



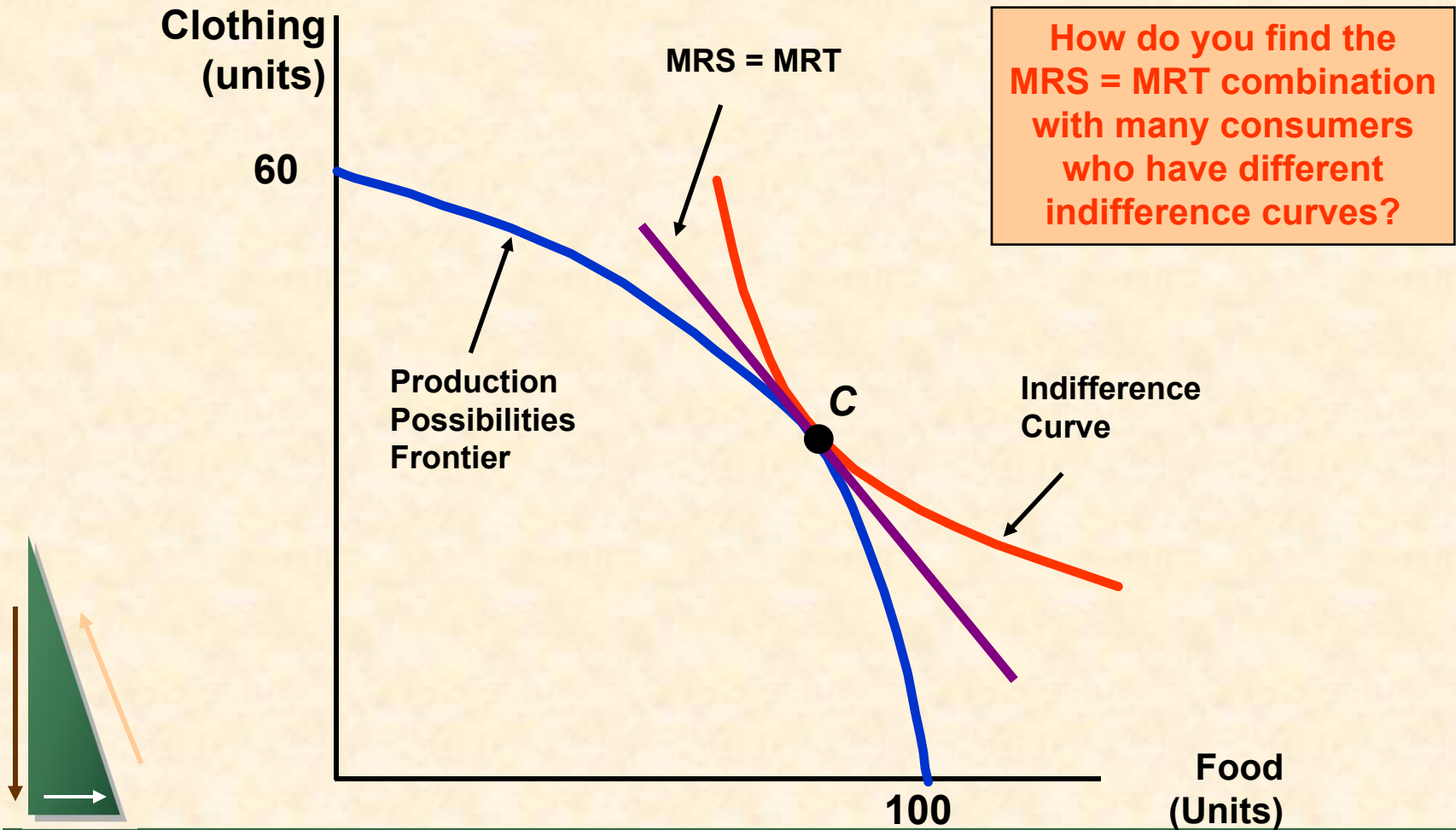
# Efficiency in Production

## ■ Assume

- $MRT = 1$  and  $MRT = 2$
- Consumers will give up 2 clothes for 1 food
- Cost of 1 food is 1 clothing
- Too little food is being produced
- Increase food production (MRS falls and MRT increases)



# Output Efficiency



# Efficiency in Production

## ■ Efficiency in Output Markets

- Consumer's Budget Allocation

$$MRS = P_F / P_C$$

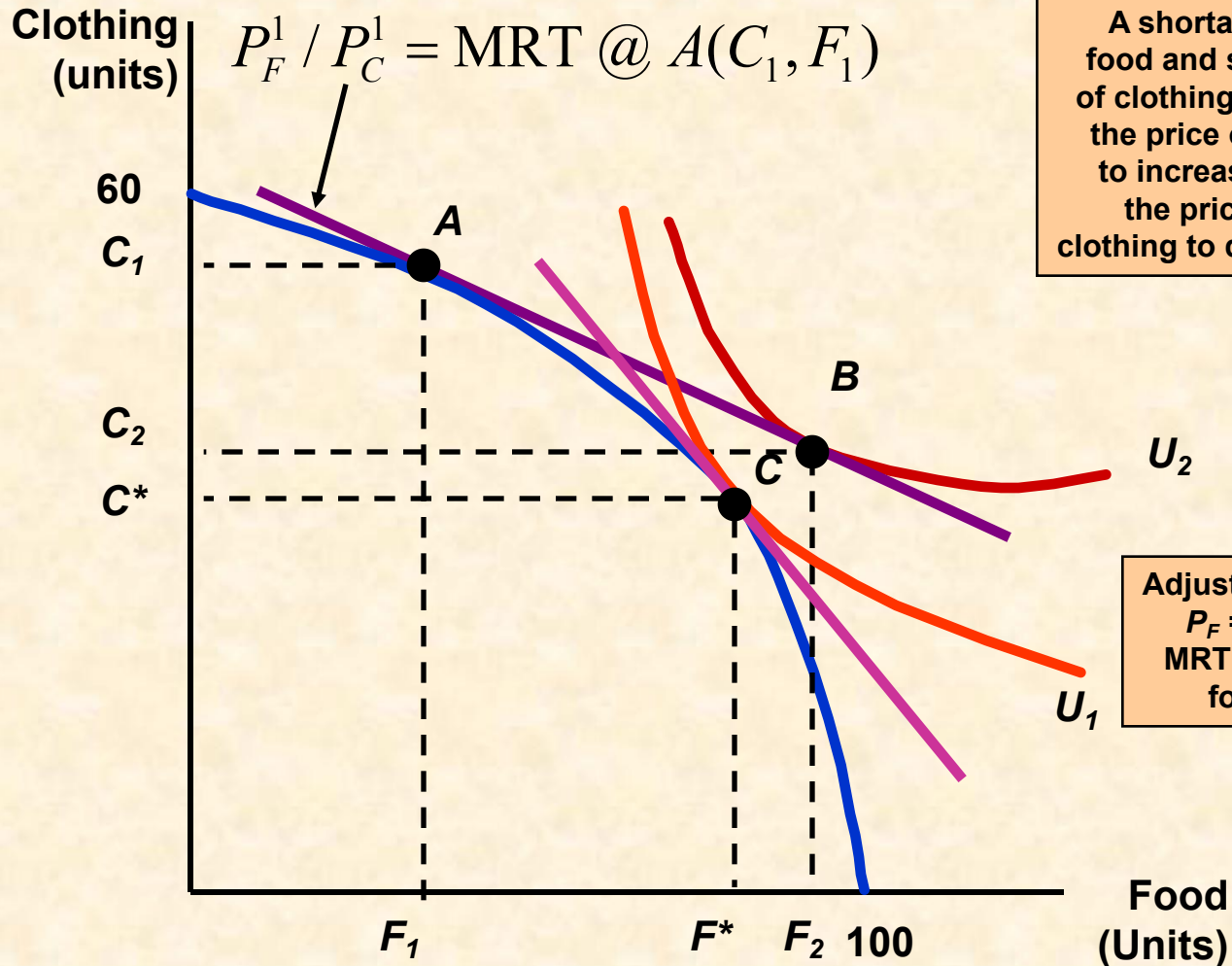
- Profit Maximizing Firm

$$P_F = MC_F \text{ and } P_C = MC_C$$

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



# Competition and Output Efficiency



A shortage of food and surplus of clothing causes the price of food to increase and the price of clothing to decrease.

Adjustment continues until  $P_F = P_F^*$  and  $P_C = P_C^*$ ;  $MRT = MRS$ ;  $Q_D = Q_S$  for food and clothing.



# The Gains from Free Trade

## ■ Comparative Advantage

- *Country 1 has a comparative advantage over country 2 in producing a good if the cost of producing that good, relative to the cost of producing other goods, in 1, is lower than the cost of producing the good in 2, relative to the cost of producing other goods in 2.*



# The Gains from Free Trade

## ■ Comparative Advantage

- Comparative advantage is a relative measurement, not absolute.
- A country with an *absolute advantage* in the production of all goods will not have a comparative advantage in the production of all goods.
  - ◆ Example: Holland and Italy produce cheese and wine



# Hours of Labor Required to Produce

	<b>Cheese (1 lb.)</b>	<b>Wine (1 gal.)</b>
<b>Holland</b>	1	2
<b>Italy</b>	6	3

**Holland has an absolute advantage in both products.**





# Hours of Labor Required to Produce

	<b>Cheese (1 lb.)</b>	<b>Wine (1 gal.)</b>
<b>Holland</b>	1	2
<b>Italy</b>	6	3

**Holland's comparative advantage over Italy is in cheese: the cost of cheese is 1/2 the cost of wine and Italy's cost of cheese is twice the cost of wine.**



# Hours of Labor Required to Produce

	<b>Cheese (1 lb.)</b>	<b>Wine (1 gal.)</b>
<b>Holland</b>	1	2
<b>Italy</b>	6	3

**Italy's comparative advantage is wine,  
which is half the cost of cheese.**



# Hours of Labor Required to Produce

	<b>Cheese (1 lb.)</b>	<b>Wine (1 gal.)</b>
<b>Holland</b>	1	2
<b>Italy</b>	6	3

**Without Trade: Assume  $PW = PC$  in Holland & Italy.  
Holland has 24 hrs. of labor--max. wine = 12 gals &  
max. cheese = 24 lbs. or a combination**



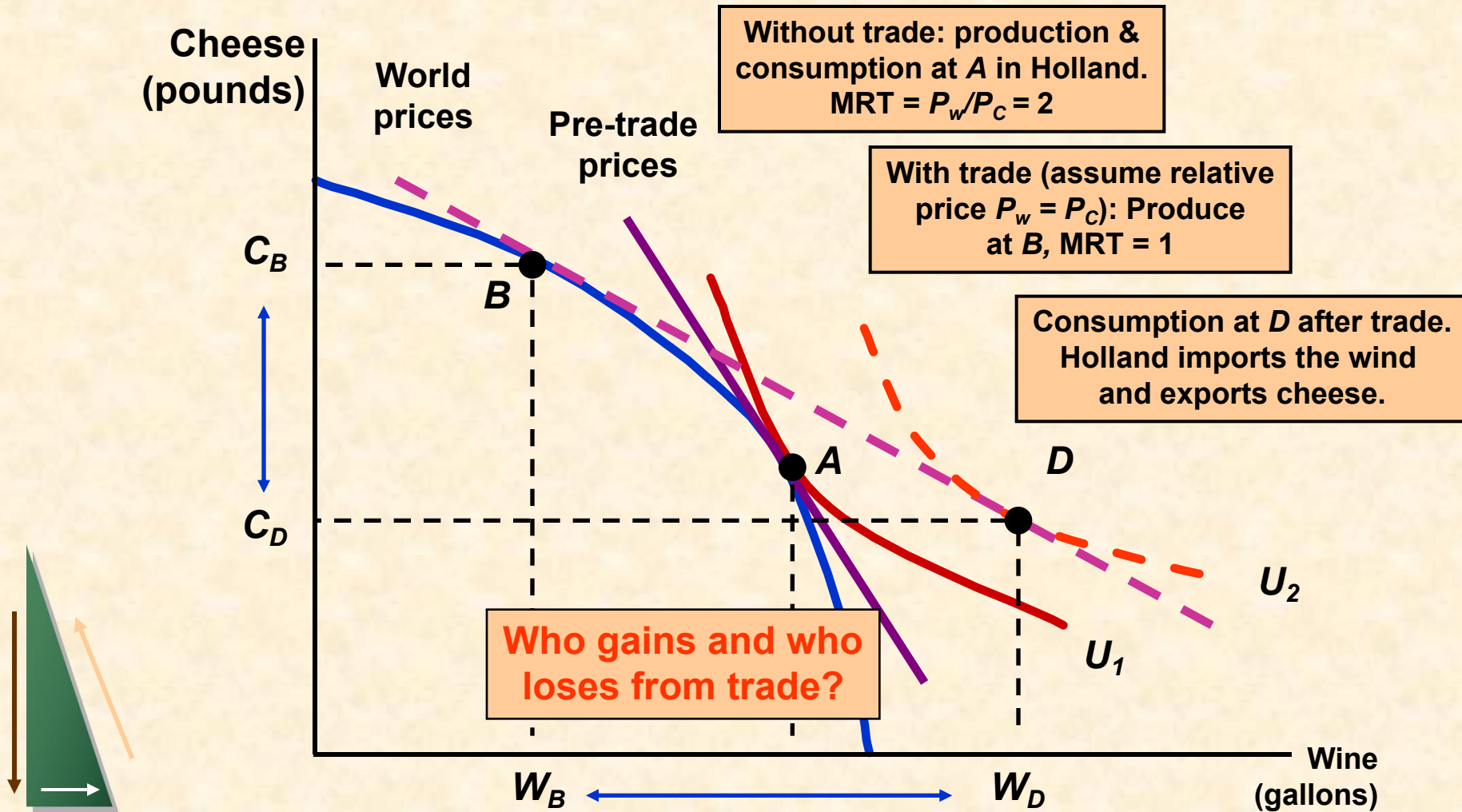
# Hours of Labor Required to Produce

	Cheese (1 lb.)	Wine (1 gal.)
Holland	1	2
Italy	6	3

**With Trade: Italy produces 8 gal. and trades 6; consumes 6 lbs. and 2 gals.  
Without Trade: 3 lbs. and 2 gals.**



# The Gains from Trade



# The Effects of Automobile Import Quotas

## ■ A Changing Automobile Market

- Imports (as a percentage of domestic sales)
  - ◆ 1965 -- 6.1%
  - ◆ 1980 -- 28.8%
- In 1981 a voluntary export restraint (VER) was negotiated.
  - ◆ In 1980 Japan exported 2.5 million cars to the U.S.
  - ◆ In 1981 with the VER exports fell to 1.68 million cars.



# The Effects of Automobile Import Quotas

---

---

## ■ Measuring the Impact of the VER

- 1) Japanese car prices rose nearly \$1,000/car in 1981-1982, and revenue increase by \$2 billion.
- 2) Demand for U.S. cars increased U.S. profits by \$10 billion



# The Effects of Automobile Import Quotas

## ■ Measuring the Impact of the VER

3) U.S. car prices were \$350 to \$400/auto higher than they would have been without VER, or consumers were worse off by \$3 billion .

4) U.S. sales rose by 500,000 units creating about 26,000 jobs.





# The Effects of Automobile Import Quotas

## ■ Measuring the Impact of the VER

$$\begin{aligned} 5) \text{ Cost/Job} &= \$4.3 \text{ billion (consumer} \\ &\text{ cost)}/26,000 \text{ jobs)} \\ &= \$160,000 \end{aligned}$$



# Quantifying the Costs of Protection

---

---

<i>Industry</i>	<i>Producer Gains (\$ millions)</i>	<i>Consumer Losses (\$millions)</i>	<i>Efficiency Losses (\$millions)</i>
Book manufacturing	305	500	29
Orange juice	390	525	130
Textiles an apparel	22,000	27,000	4,850
Carbon steel	3,800	6,800	330
Color televisions	190	420	7
Sugar	550	930	130
Dairy products	5,000	5,500	1,370
Meat	1,600	1,800	145

# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *Efficiency in Exchange*

$$MRS_{FC}^J = MRS_{FC}^K$$



# An Overview--The Efficiency of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

---

---

- Conditions Required for Economic Efficiency
  - *Efficiency in Exchange (for a competitive market)*

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



# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *Efficiency in the Use of Inputs in Production*

$$\text{MRTS}_{LK}^F = \text{MRTS}_{LK}^C$$



# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *Efficiency in the Use of Inputs in Production (for a competitive market)*

$$\text{MRTS}_{LK}^F = w / r = \text{MRTS}_{LK}^C$$



# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *Efficiency in the Output Market*

$$MRT_{FC} = MRS_{FC} \text{ (for all consumers)}$$



# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *Efficiency in the Output Market (in a competitive market)*

$$P_F = MC_F, P_C = MC_C$$

$$\text{MRT}_{FC} = MC_F / MC_C = P_F / P_C$$





# An Overview of Competitive Markets

高参考价值的真题、答案、学长笔记、辅导班课程，访问：[www.kaoyancas.net](http://www.kaoyancas.net)

- Conditions Required for Economic Efficiency
  - *However, consumers maximize their satisfaction in competitive markets only if*

$$P_F / P_C = \text{MRS}_{FC} \text{ (for all consumers)}$$

$$\text{Therefore, } \text{MRS}_{FC} = \text{MRT}_{FC}$$



# Why Markets Fail

## ■ Market Power

- In a monopoly in a product market,  $MR < P$ 
  - ◆  $MC = MR$
  - ◆ Lower output than a competitive market
  - ◆ Resources allocated to another market
  - ◆ Inefficient allocation



# Why Markets Fail

## ■ Market Power

### ● Monopsony in the labor market

◆ Restricted supply of labor in food

◆  $w_f$  would rise,  $w_L$  would fall

◆ Clothing input:

$$\text{MRTS}_{LK}^C = w_c / r$$

◆ Food input:

$$\text{MRTS}_{LK}^F = w_F / r > w_c / r = \text{MRTS}_{LK}^C$$



# Why Markets Fail

---

---

## ■ Incomplete Information

- Lack of information creates a barrier to resource mobility.

## ■ Externalities

- When consumption or production creates cost and benefits to third parties which changes the cost and benefits of decisions and create inefficiencies.



# Why Markets Fail

---

---

## ■ Public Good

- Markets undersupply public goods because of difficulty associated with measuring consumption.



# Summary

---

---

- Partial equilibrium analyses of markets assume that related markets are unaffected, while general equilibrium analyses examine all markets simultaneously.
- An allocation is efficient when no consumer can be made better off by trade without making someone else worse off.



# Summary

---

---

- A competitive equilibrium describes a set of prices and quantities, so that when each consumer chooses his or her most preferred allocation, the quantity demanded is equal to the quantity supplied in every market.
- The utility possibilities frontier measures all efficient allocations in terms of the levels of utility that each person achieves.



# Summary

---

---

- Because a competitive equilibrium need not be equitable, the government may wish to help redistribute wealth from rich to poor.
- An allocation of production inputs is technically efficient if the output of one good cannot be increased without increasing the output of some other good.





# Summary

---

---

- The production possibilities frontier measures all efficient allocations in terms of the levels of output that can be produced with a given combination of inputs.
- Efficiency in the allocation of goods to consumers is achieved only when the MRS of one good for another in consumption is equal to the MRT of one good for another in production.



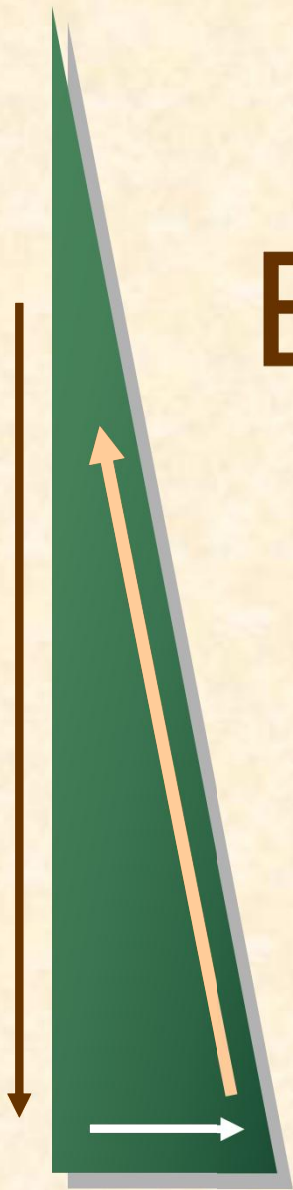
# Summary

---

---

- Free international trade expands a country's production possibilities frontier.
- Competitive markets may be inefficient for one or more of four reasons.





# End of Chapter 16

## General Equilibrium and Economic Efficiency