

General Equilibrium and Market Efficiency

- General Equilibrium and Market Efficiency
 - A Simple Exchange Economy
 - Efficiency In Production
 - Efficiency In Product Mix
- Extra Slides
 - Sources Of Inefficiency -- Taxes
 - Other Sources Of Inefficiency

A Simple Exchange Economy

- **Partial equilibrium analysis:** presumes that activity in one market is independent of other markets
- **General equilibrium analysis:** the study of how conditions in each market in a set of related markets affect equilibrium outcomes in other markets in that set

The Pareto Criterion

- **Pareto superior allocation:** an allocation that at least one individual prefers and others like at least as well.
- **Pareto optimal:** the term used to describe situations in which it is impossible to make one person better off without making at least some others worse off.
- 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.

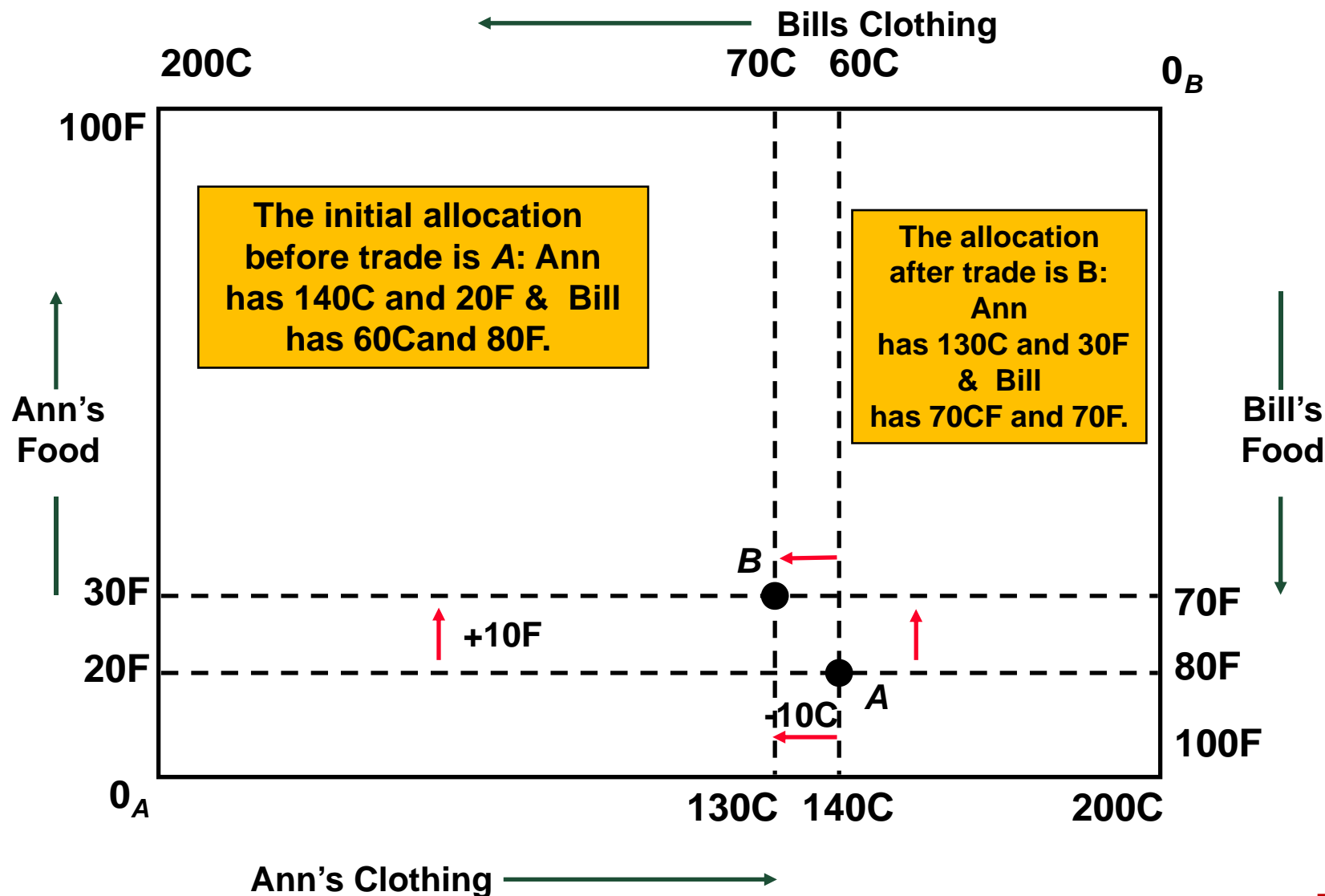
- Simple economy in which there are only two consumers—Ann and Bill— and two goods, food and clothing
 - *Allocation*: an assignment of these total amounts between Ann and Bill
 - *Initial endowments*: the amounts of the two goods with which Ann and Bill begin each time period
 - Ann and Bill have a total of 100 units of food and 200 units of clothing
 - Say initial endowments are, Ann (140 C and 20 F) and Bill (60 C and 80 F)
 - Both people know each others preferences
 - Exchanging goods involves zero transaction costs
- The Edgeworth Box Diagram
 - Which trades can occur and which allocation will be efficient can be illustrated using a diagram called an **Edgeworth Box**

The Advantage of Trade

Individual	Initial Allocation	Trade	Final Allocation
Ann	140C, 20F	-10C, +10F	130C, 30F
Bill	60C, 80F	+10C, -10FC	70C, 70F

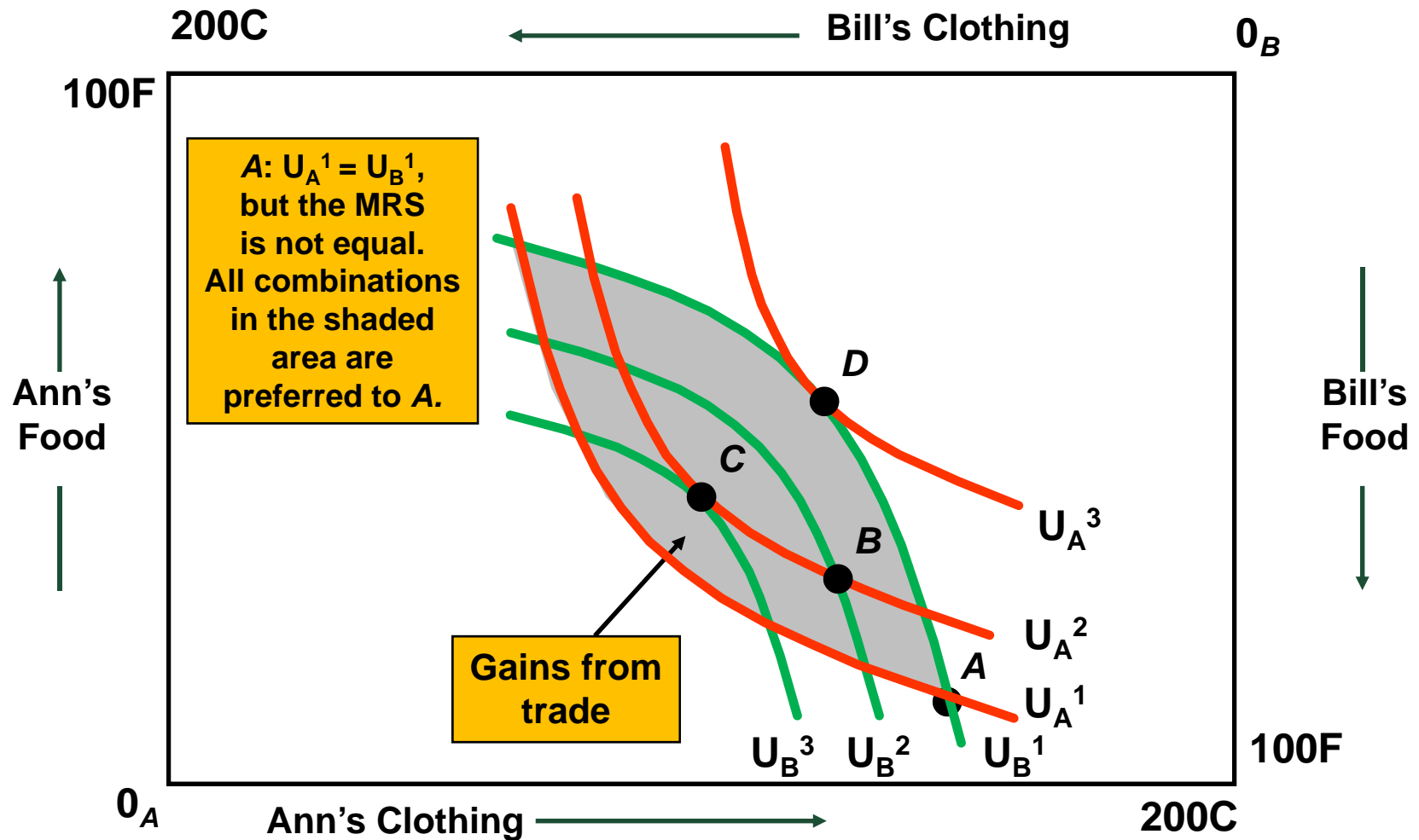
- If Bill's MRS of food for clothing is 4, and Ann's MRS of food for clothing is 1/4
 - Bill and Ann are willing to trade
 - Say Bill trades 10C for 10F
- When the MRS is not equal, there is gain from trade
- The economically efficient allocation occurs when the MRS is equal
- **Recall that:** The marginal rate of substitution of good or service X for good or service Y (MRS_{xy}) is equal to the marginal utility of X over the marginal utility of Y:
 - $MRS_{xy} = MU_x / MU_y$
 - Slope of the indifference curve: $-\frac{dy}{dx} = \frac{MU_x}{MU_y}$

Exchange in an Edgeworth Box

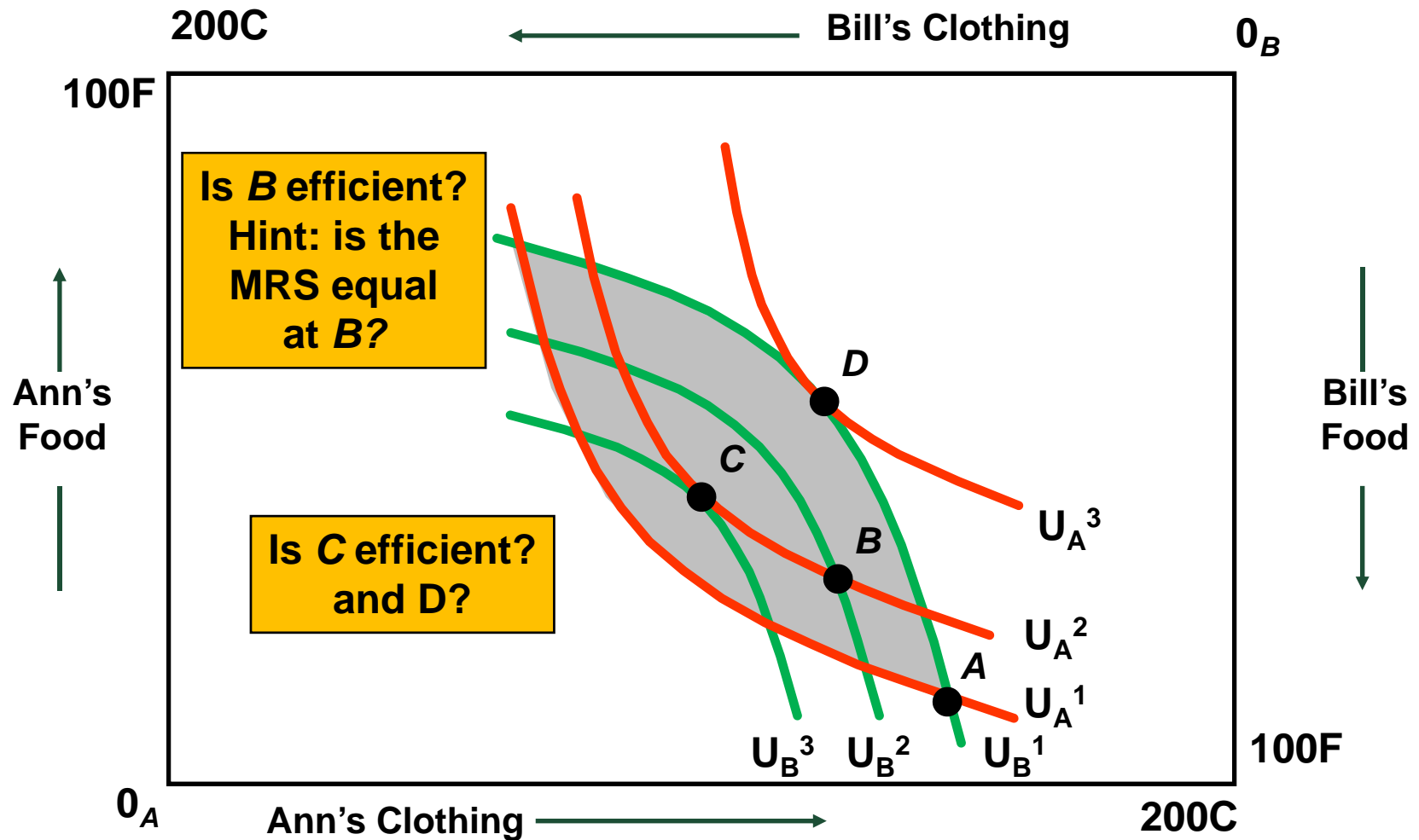


- Efficient Allocations
 - If Ann's and Bill's MRS are the same at B the allocation is *efficient*
 - This depends on the shape of their indifference curves
 - Ann's MRS: $MRS_{FC}^A = MU_F^A / MU_C^A$
 - Bill's MRS: $MRS_{FC}^B = MU_F^B / MU_C^B$
 - If not, they gain from further trade

Efficiency in Exchange



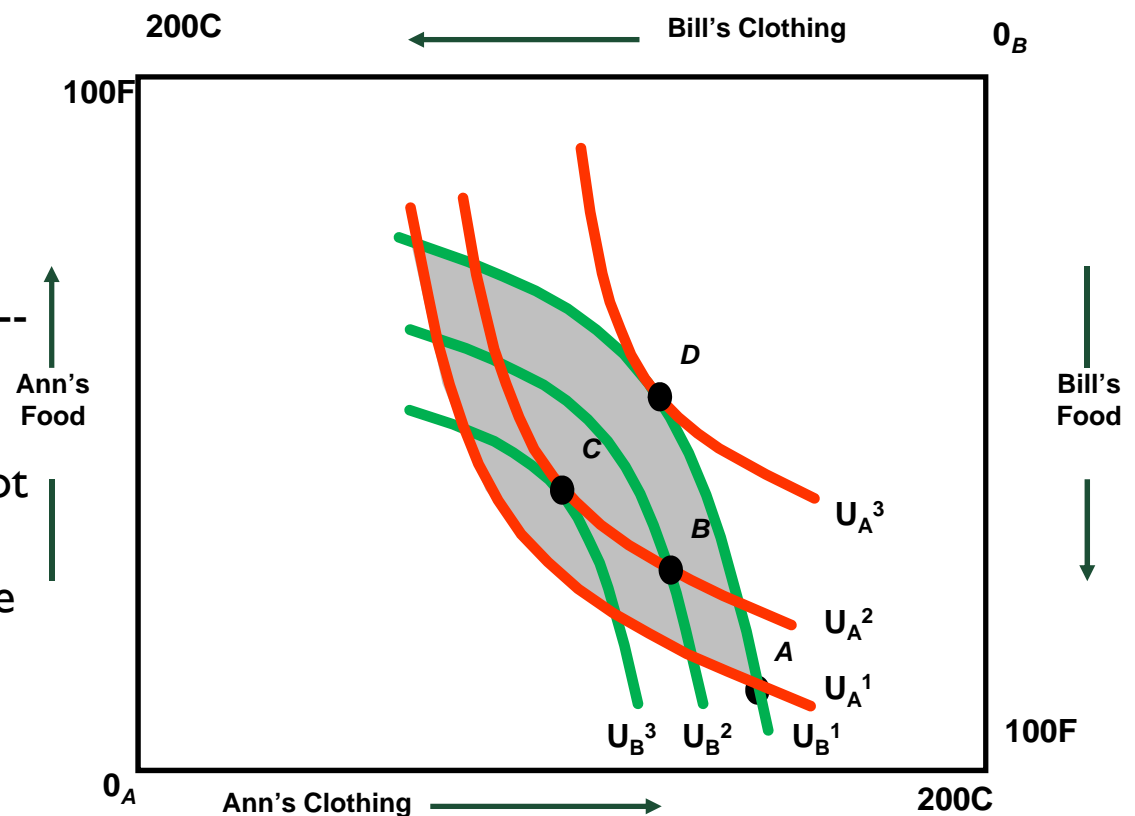
Efficiency in Exchange



Efficiency in Exchange

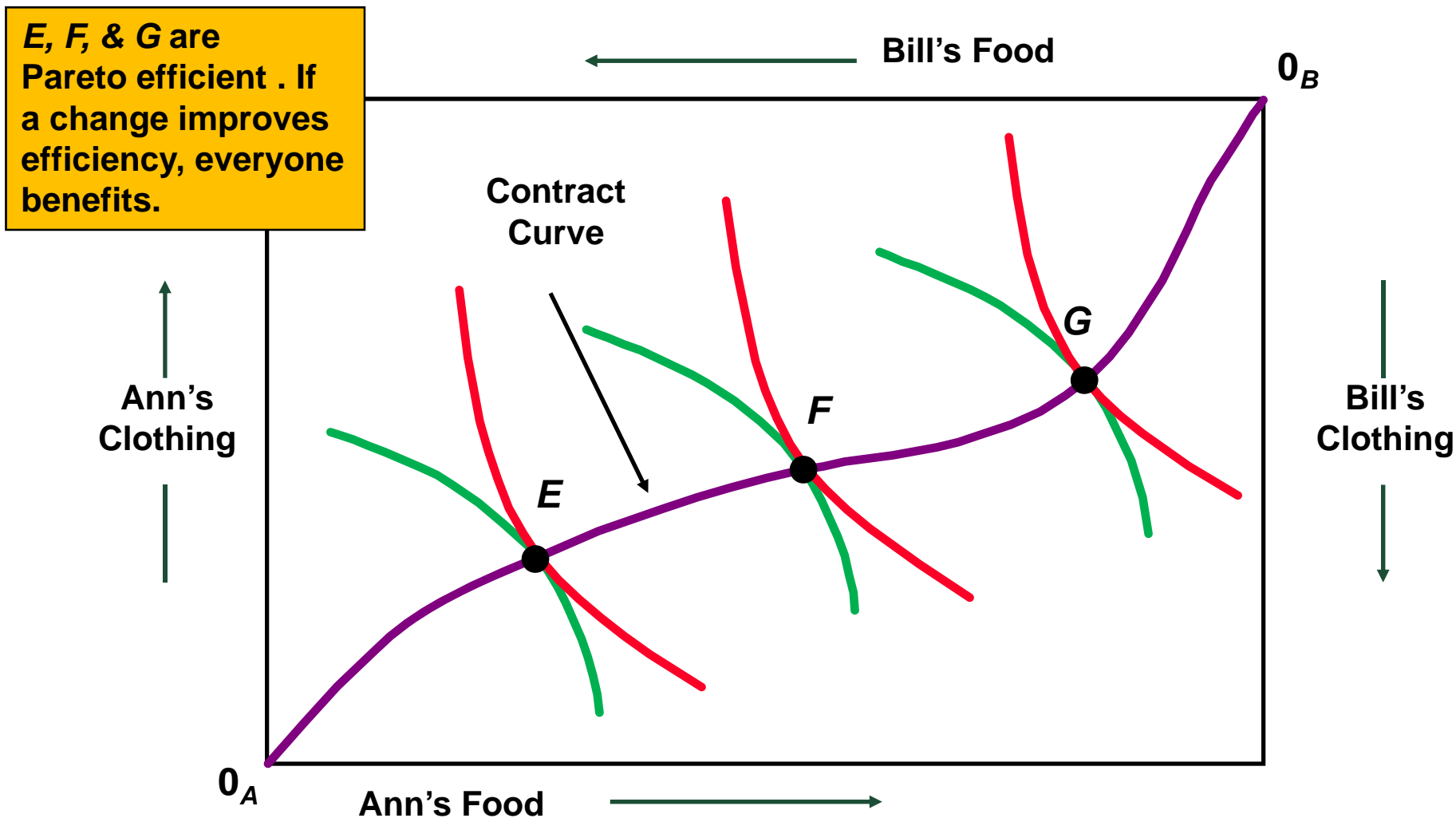
- Efficient Allocations

- 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.



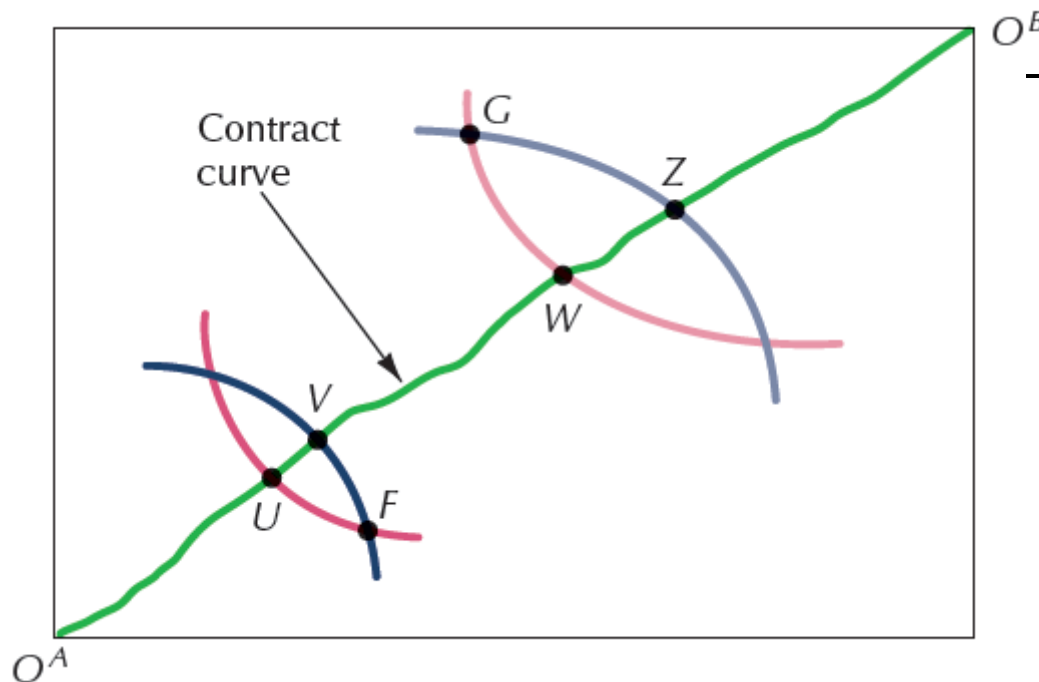
- The Contract Curve
 - Identifies all the **efficient ways** of dividing the two goods between the two consumers.
 - To find *all possible efficient allocations of food and clothing* between Bill and Ann, we would look for all points of tangency between each of their indifference curves.

The Contract Curve



Efficiency in Exchange

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



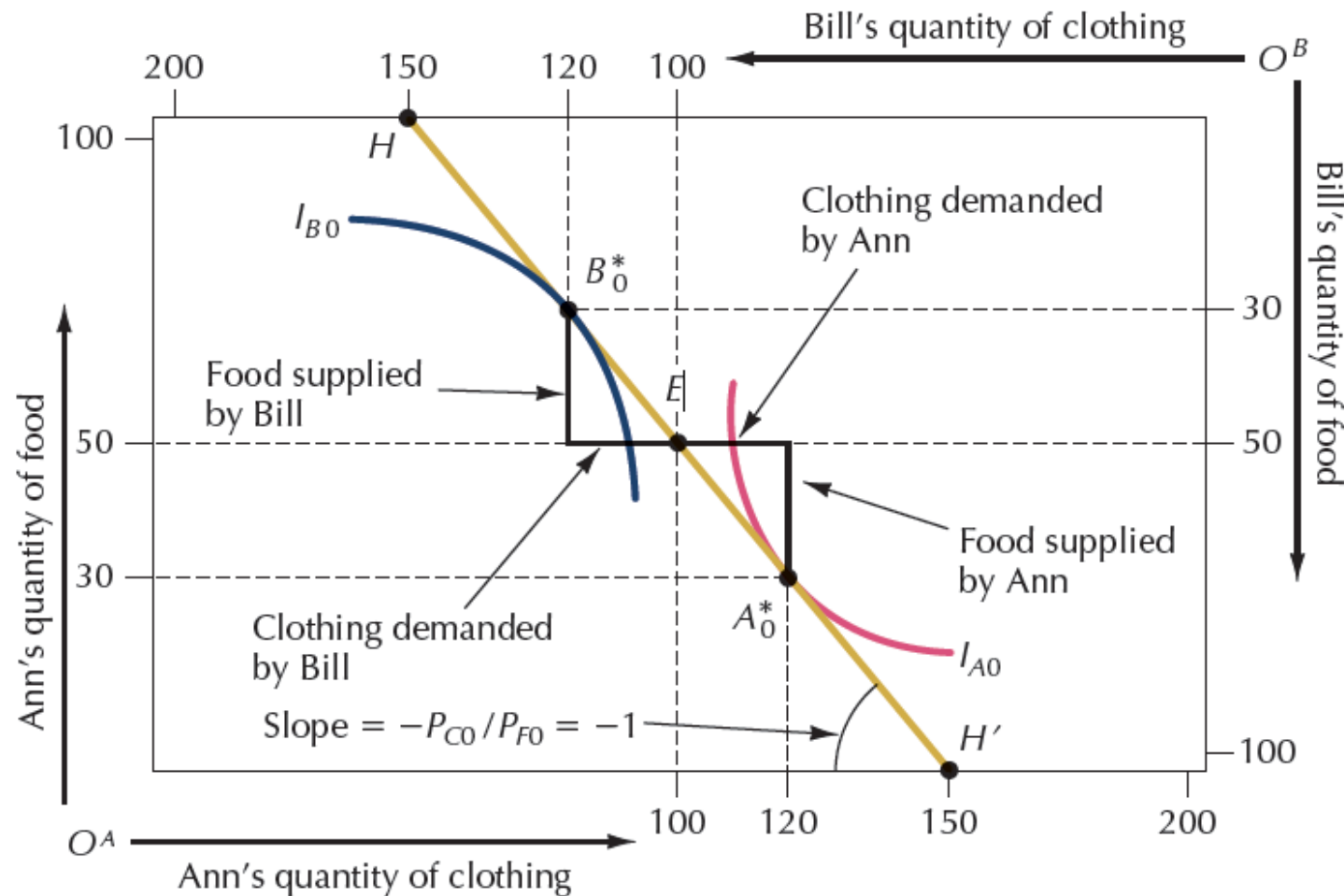
– Initial Endowments Constrain Final Outcomes

- Starting from F , traders will move to a point on the contract curve between U and V
- If they start at G , they will end up between W and Z on the contract curve.

Equilibrium in Exchange Economy

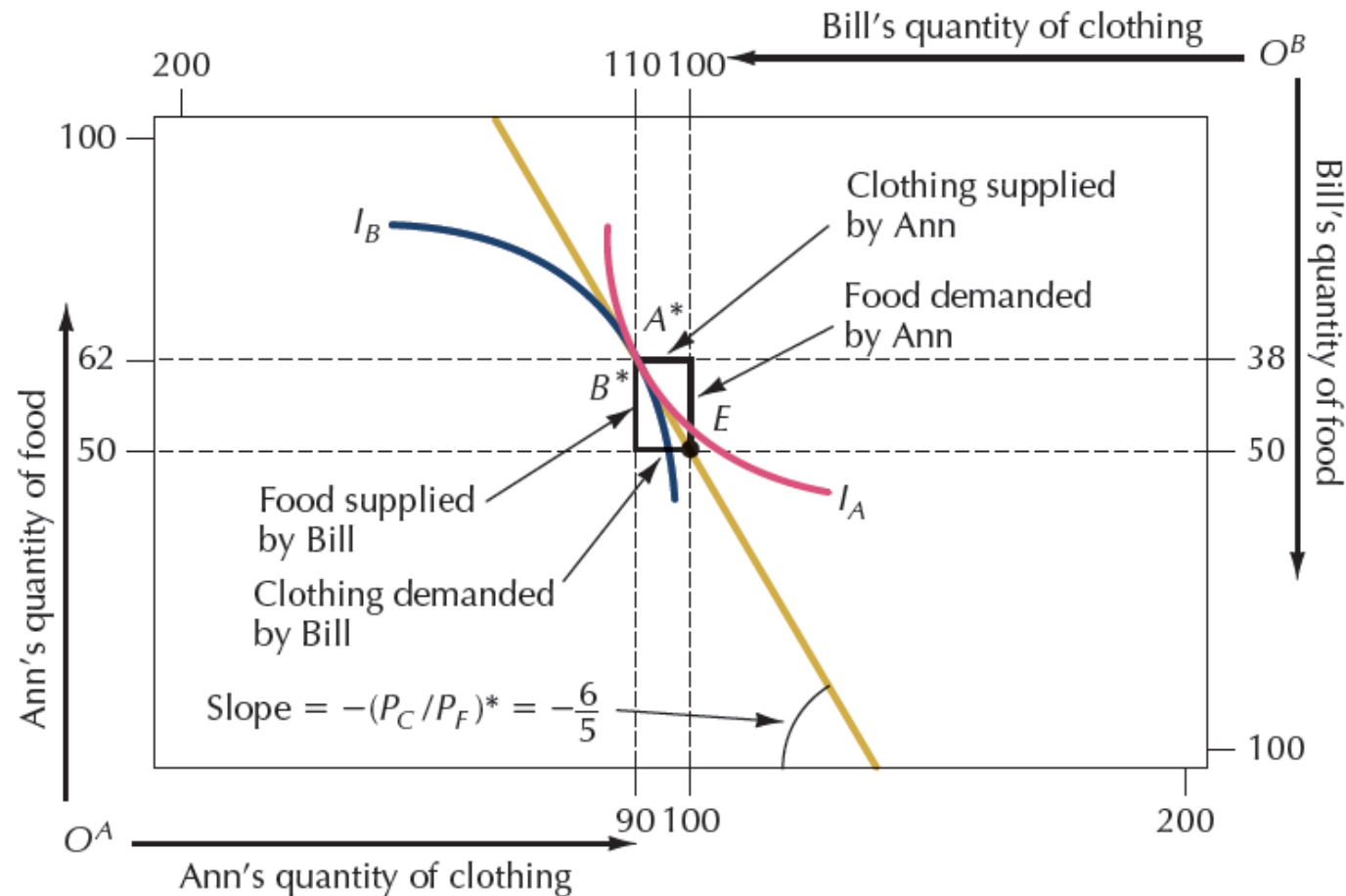
- Suppose Ann and Bill start with the allocation in which each has 50 units of food and 100 units of clothing
- Suppose also that the ratio of food to clothing prices announced by the auctioneer is $PC/PF = 1$, meaning that food and clothing both sell for the same price
 - given initial endowments, this rate of exchange uniquely determines the budget constraints for both Ann and Bill
- Given this price ratio
 - Bill will maximize his utility by moving to point B_0^* (120 C and 30 F) and Ann will maximize her utility by moving to A_0^* (120 C and 30 F)
 - Thus each is will to supply 20 units of food and each demands 20 units of clothing ...

A Disequilibrium Relative Price Ratio



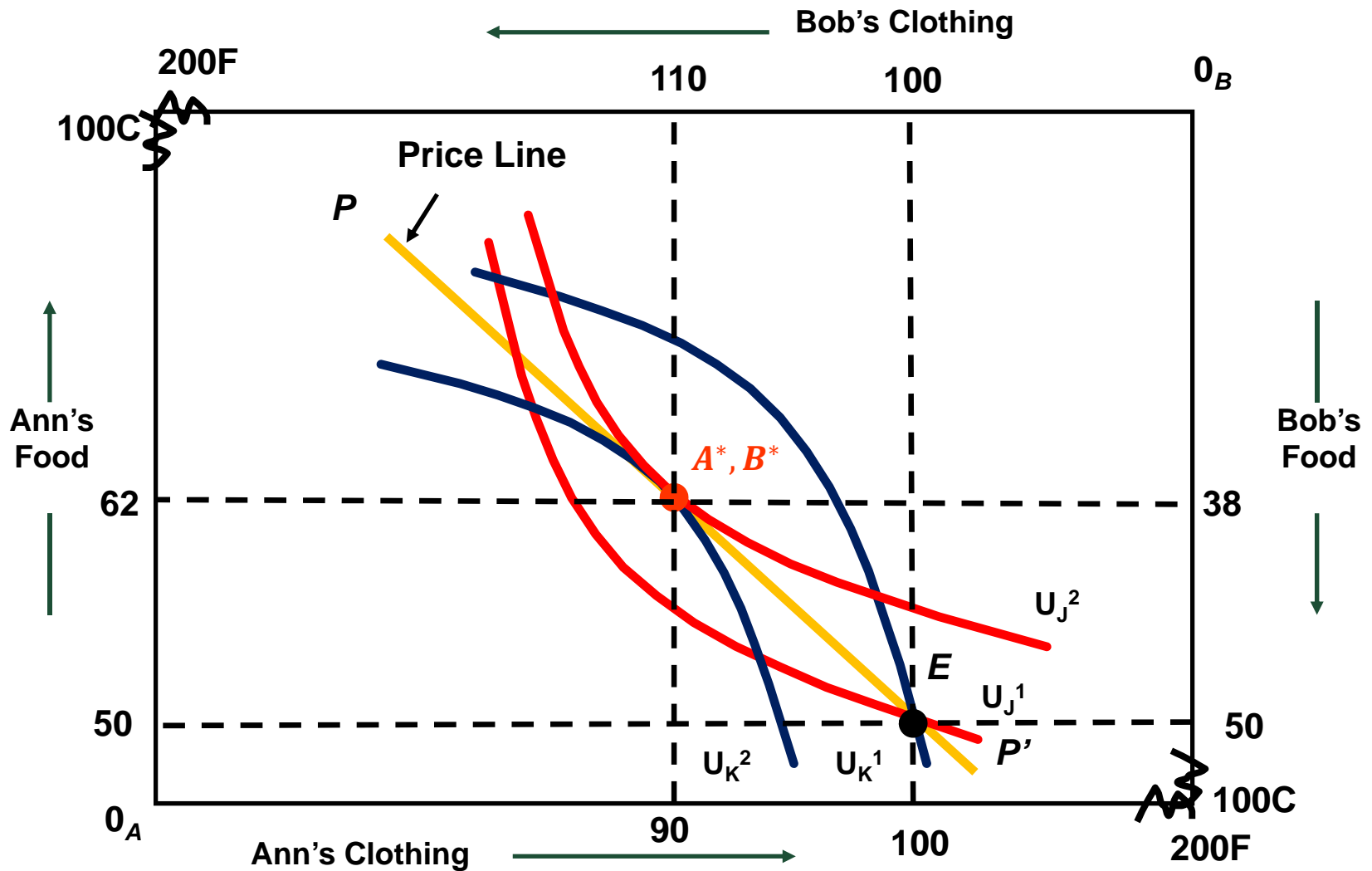
- At this price ratio the markets are not in general equilibrium... something must change ...

General Equilibrium



- the auctioneer simply calls out a new price ratio in which the price of clothing relative to food is higher than before ... continues increasing price until excess demand in each market is exactly zero

Competitive Equilibrium



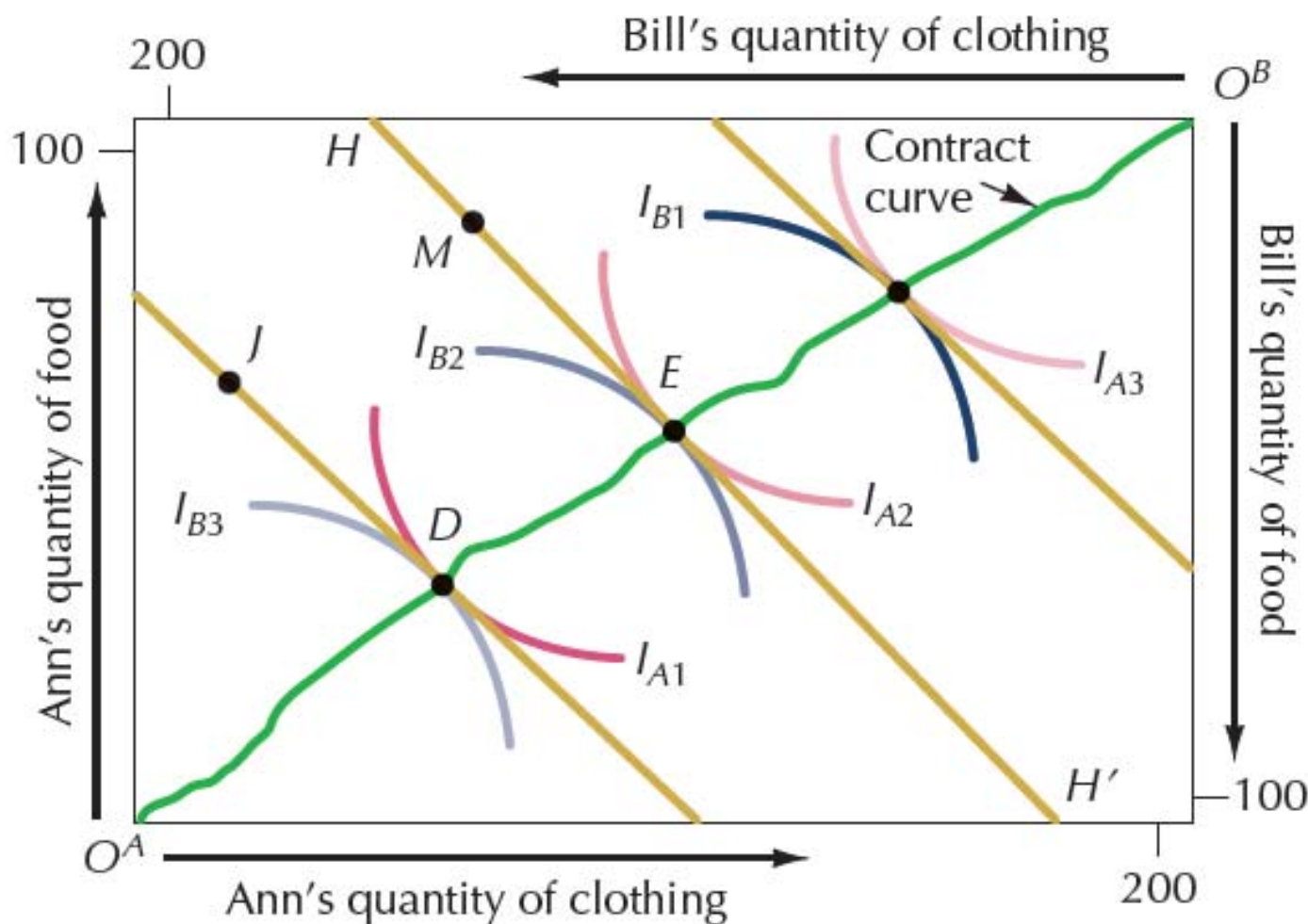
The Invisible Hand Theorem

- An equilibrium produced by competitive markets will exhaust all possible gains from exchange.
 - *Equilibrium in competitive markets is Pareto optimal.*
 - Since the two indifference curves are tangent, the competitive equilibrium allocation is efficient
 - If the indifference curves were not tangent, trade would occur
 - The competitive equilibrium is achieved without intervention
- 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*)

Second Theorem of Welfare Economics

- Second Theorem of Welfare Economics
 - If individual preferences are convex, then every efficient allocation is a competitive equilibrium from some initial allocation of goods
 - i.e., Any allocation on the contract curve can be sustained as a competitive equilibrium
 - *The significance of the second welfare theorem is that the issue of equity in distribution is logically separable from the issue of efficiency in allocation*
- Equity and Perfect Competition
 - A competitive equilibrium leads to a Pareto efficient outcome that may or may not be equitable

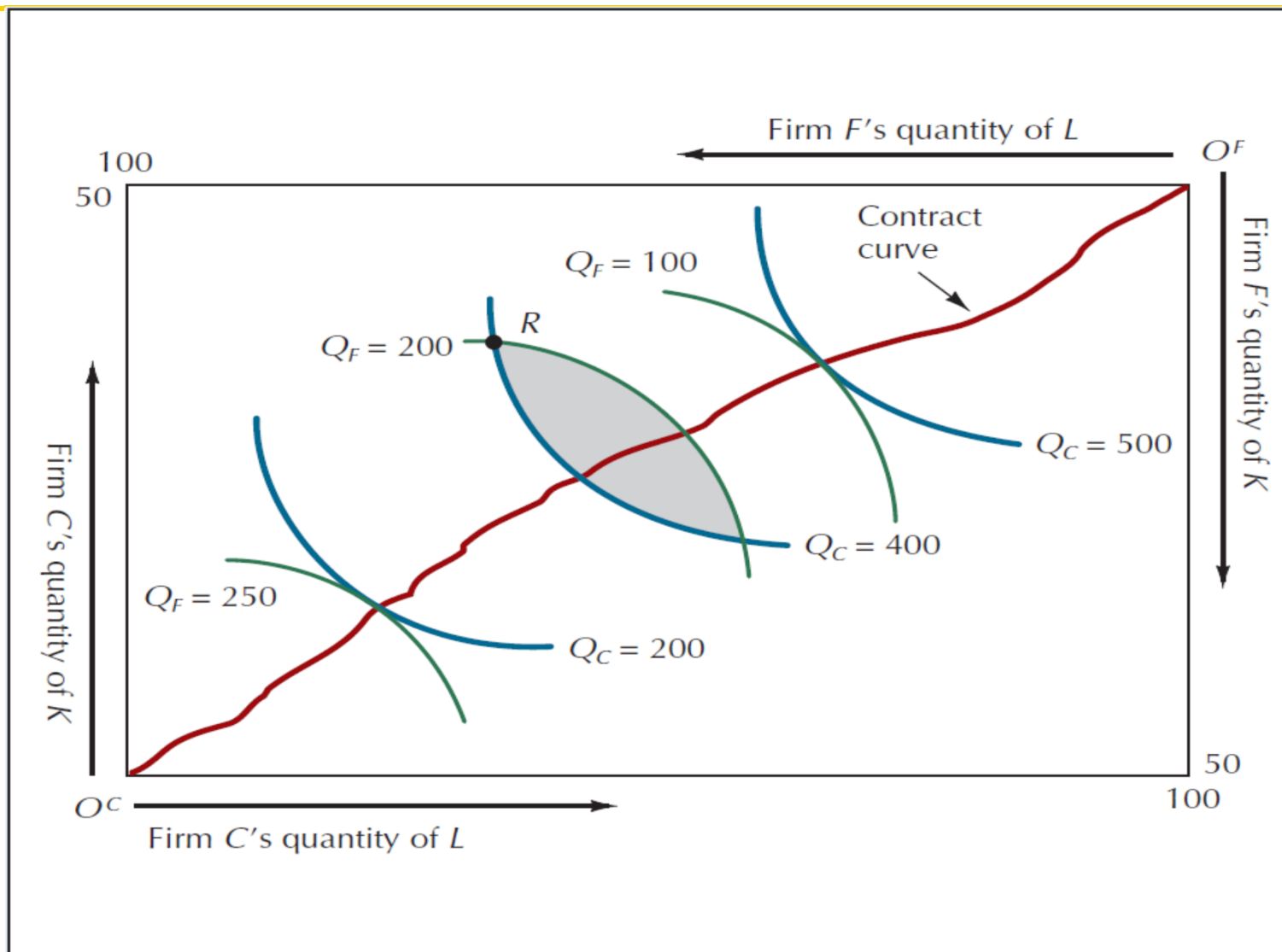
Sustaining Efficient Allocations



Efficiency In Production

- Suppose we now add a productive sector to our exchange economy, one with two firms, each of which employs two inputs—capital (K) and labor (L)—to produce either of two products, food (F) or clothing (C).
 - suppose firm C produces clothing and firm F produces food.
 - suppose that the total quantities of the two inputs are fixed at $K = 50$ and $L = 100$, respectively
 - Also assume that the technologies give rise to conventional convex shaped isoquants
 - we can study conditions required for efficiency in production using **Edgeworth production box**
 - the marginal rates of technical substitution for the two firms will be equal in competitive equilibrium

An Edgeworth Production Box



Efficiency in Production

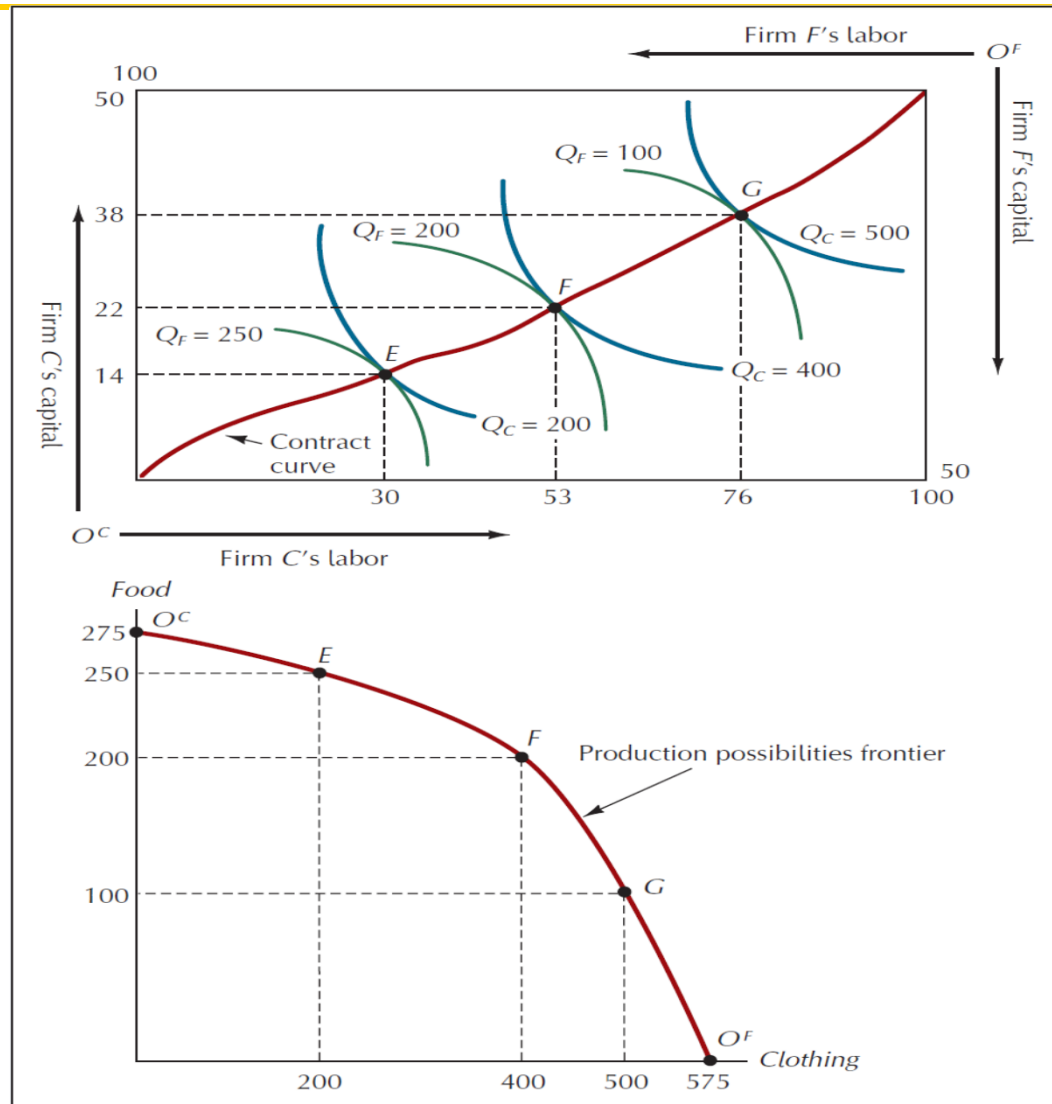
- Competitive Market Observations
 - The wage rate (w) and the price of capital (r) will be the same for all industries
 - Minimize production cost
 - $MP_L/MP_K = w/r$
 - $w/r = MRTS_{LK}$
 - $MRTS$ = slope of the isoquant
 - Competitive equilibrium is on the production contract curve.
 - Competitive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

Efficiency In Production

- *The marginal rates of technical substitution for the two firms will be equal in competitive equilibrium*
- *Competitive general equilibrium is efficient not only in the allocation of a given endowment of consumption goods, but also in the allocation of the factors used to produce those goods*

- ***Production possibilities frontier***: the set of all possible output combinations that can be produced with a given endowment of factor inputs
- ***Marginal rate of transformation (MRT)***: the rate at which one output can be exchanged for another at a point along the production possibilities frontier
- For an economy to be efficient in terms of its product mix, it is necessary that *the marginal rate of substitution for every consumer be equal to the marginal rate of transformation*
- 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 $MRS = MRT$

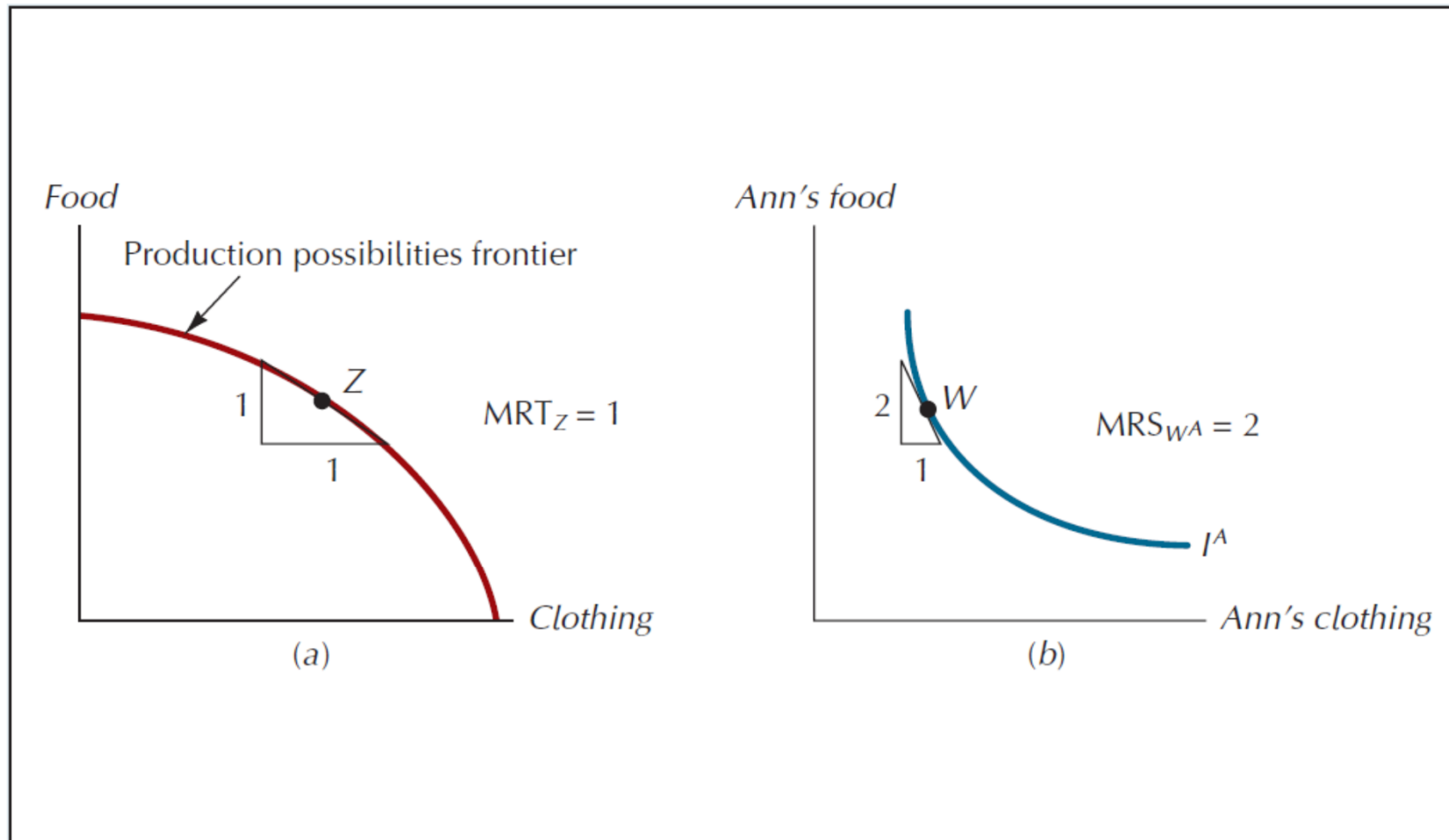
Generating the Production Possibilities Frontier



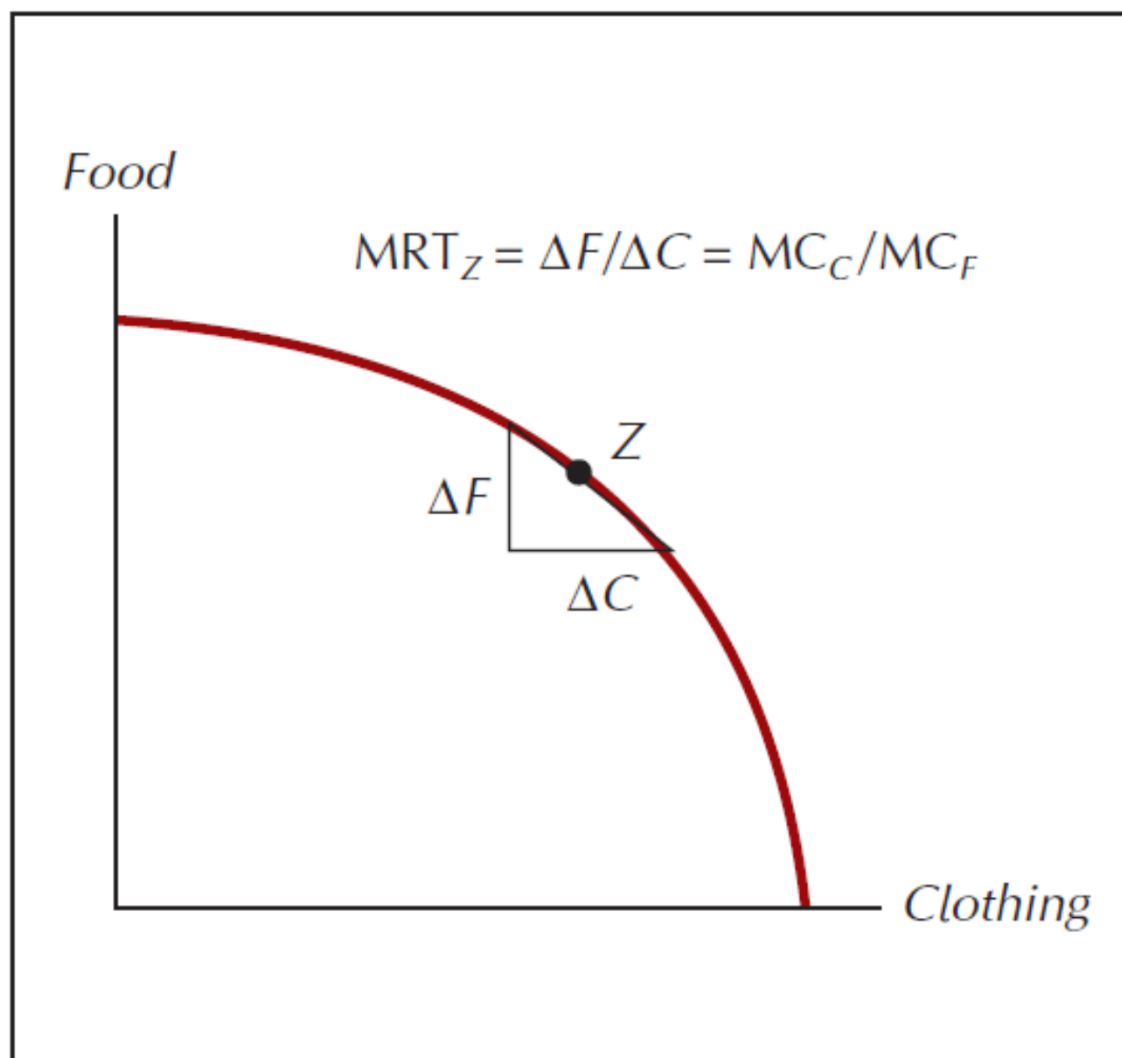
- The Production Possibilities Frontier
 - Shows the various combinations of food and clothing that can be produced with fixed inputs of labor and capital
 - Derived from the contract curve

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An Inefficient Product Mix



MRT Equals the Ratio of Marginal Costs



Efficiency of Competitive Markets

- **Efficiency in Exchange:**

- $MRS_{CF}^A = MRS_{CF}^B$
- And in a competitive market:
- $MRS_{CF}^A = P_C/P_F = MRS_{CF}^B$

- **Efficiency in Production:**

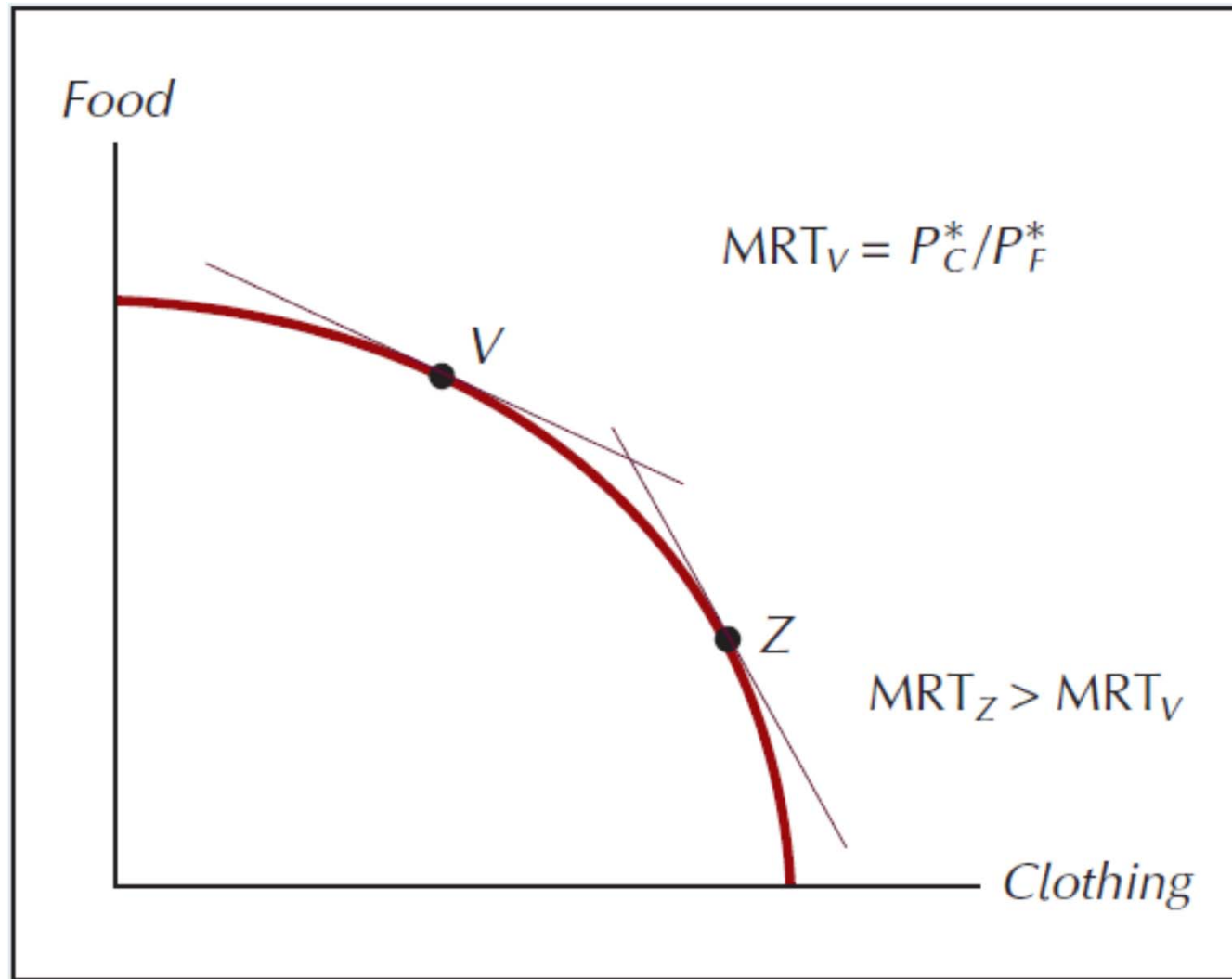
- $MRTS_{LK}^F = MRTS_{LK}^C$
- And in a competitive market:
- $MRTS_{LK}^F = w/r = MRTS_{LK}^C$

- **Efficiency in the output Market:**

- $MRT_{CF} = MRS_{CF}$ (for all consumers)
- And in a competitive market
- $P_F = MC_F$; $P_C = MC_C$; and $MRT_{CF} = MC_C/MC_F = P_C/P_F$
- However, consumers maximize their satisfaction if $P_C/P_F = MRS_{CF}$ (for all consumers), hence
- $MRS_{CF} = MRT_{CF}$

Extra Slides

Taxes Affect Product Mix



Taxes In General Equilibrium

- A tax on food does not alter the fact that consumers will all have a common value of MRS in equilibrium.
 - Nor does it alter the fact that producers will all have a common value of MRTS.
- The real problem created by the tax is that it causes producers to see a different price ratio from the one seen by consumers.

Other Sources Of Inefficiency

- Monopoly
 - $MR < P$ & $MC = MR \rightarrow$ lower output and higher prices than competitive market. Inefficient allocation.
- 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
- Public Goods
 - Markets undersupply public goods because of difficulty associated with measuring consumption