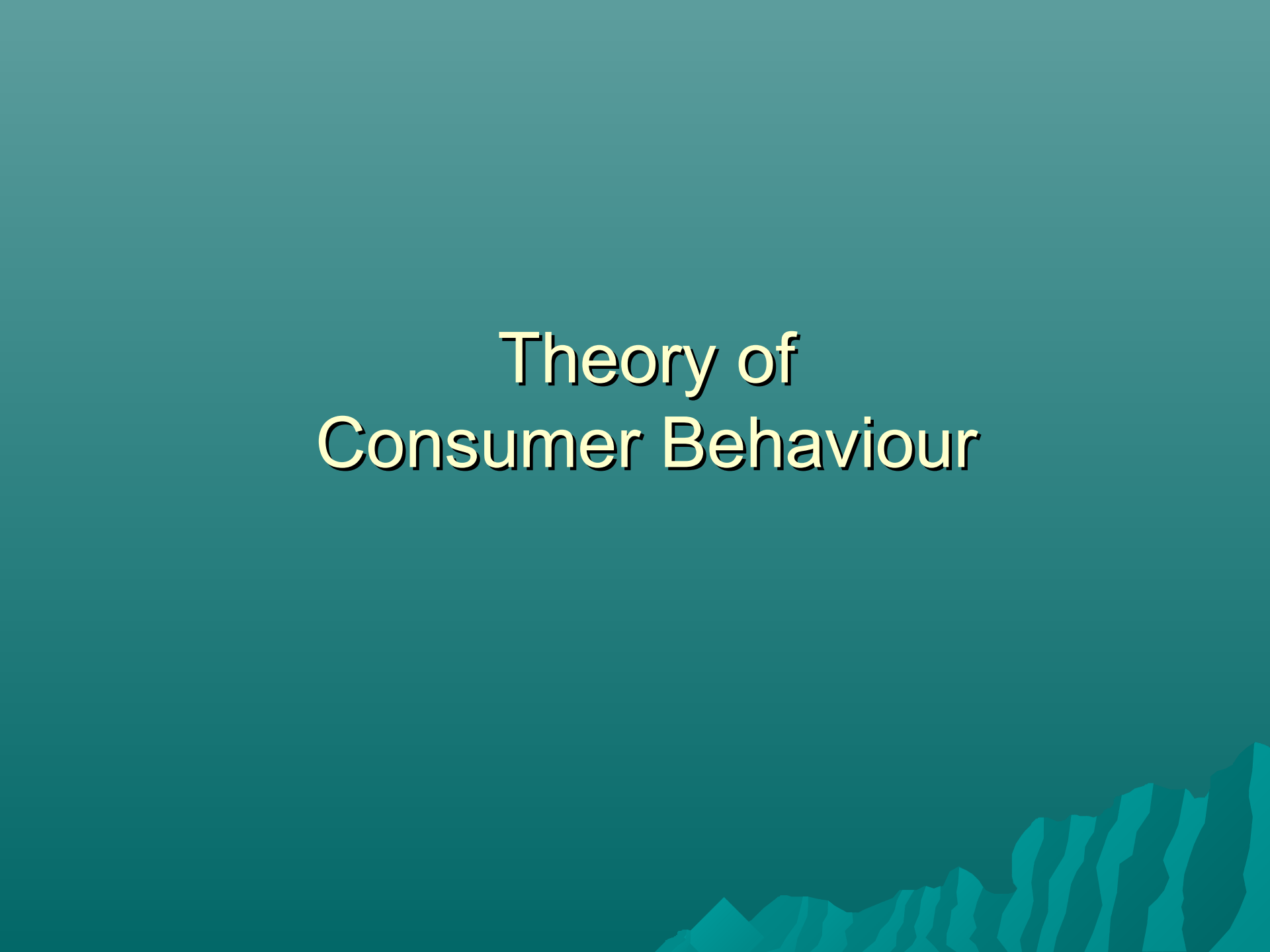


# Theory of Consumer Behaviour

The background is a solid teal color. At the bottom of the slide, there is a stylized, low-poly silhouette of a mountain range in a darker shade of teal.

# Introduction

- ◆ How are consumer preferences used to determine demand?
- ◆ How do consumers allocate income to the purchase of different goods?
- ◆ How do consumers with limited income decide what to buy?

# Theory of Consumer Behaviour

The explanation of how consumers allocate income to the purchase of different goods and services so as to maximise utility\*

*\*Utility implies satisfaction derived from consumption\_*

# Steps: Study of Consumer Behaviour

## 1. *Consumer Preferences*

- To describe how and why people prefer one good to another

## 2. *Budget Constraints*

- People have limited incomes

## 3. Given preferences and limited incomes, what amount and type of goods will be purchased?

- What combination of goods will consumers buy to maximize their satisfaction?

# Consumer Preferences

- ◆ How might a consumer compare different groups of items available for purchase?
- ◆ A *market basket* is a collection of one or more commodities
- ◆ Individuals can choose between market baskets containing different goods

# Consumer Preferences – Basic Assumptions

1. Preferences are *complete*
  - Consumers can rank market baskets
2. Preferences are *transitive*
  - If they prefer A to B, and B to C, they must prefer A to C
3. Consumers *always prefer more* of any good to less (non-satiety)
  - More is better

# Consumer Preferences

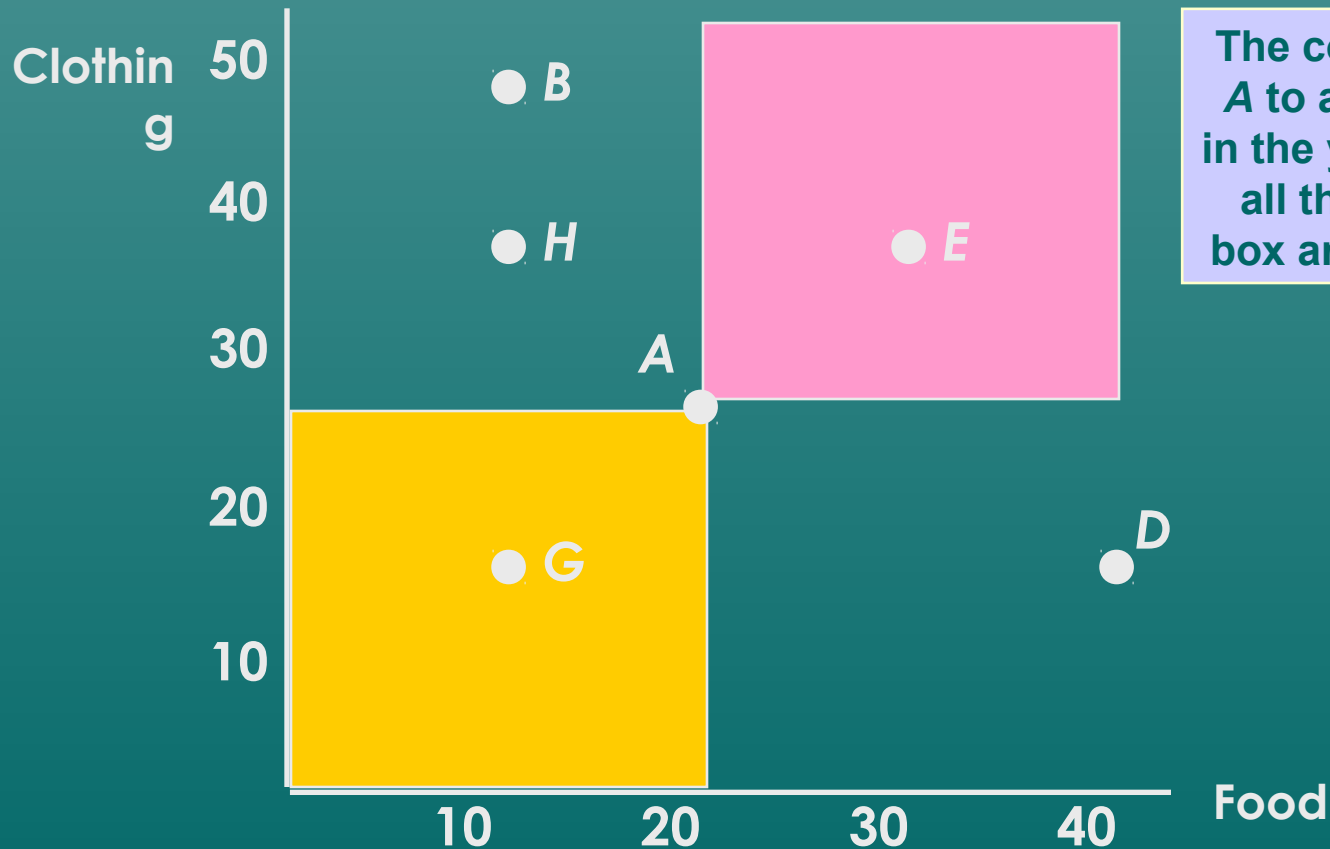
- ◆ Consumer preferences can be represented graphically using *indifference curves*
- ◆ Indifference curves represent all combinations of market baskets that the person is *indifferent to*
  - A person will be equally satisfied with either choice

# Indifference Curves: An Example

<b>Market Basket</b>	<b>Units of Food</b>	<b>Units of Clothing</b>
A	20	30
B	10	50
D	40	20
E	30	40
G	10	20
H	10	40



# Indifference Curves: An Example

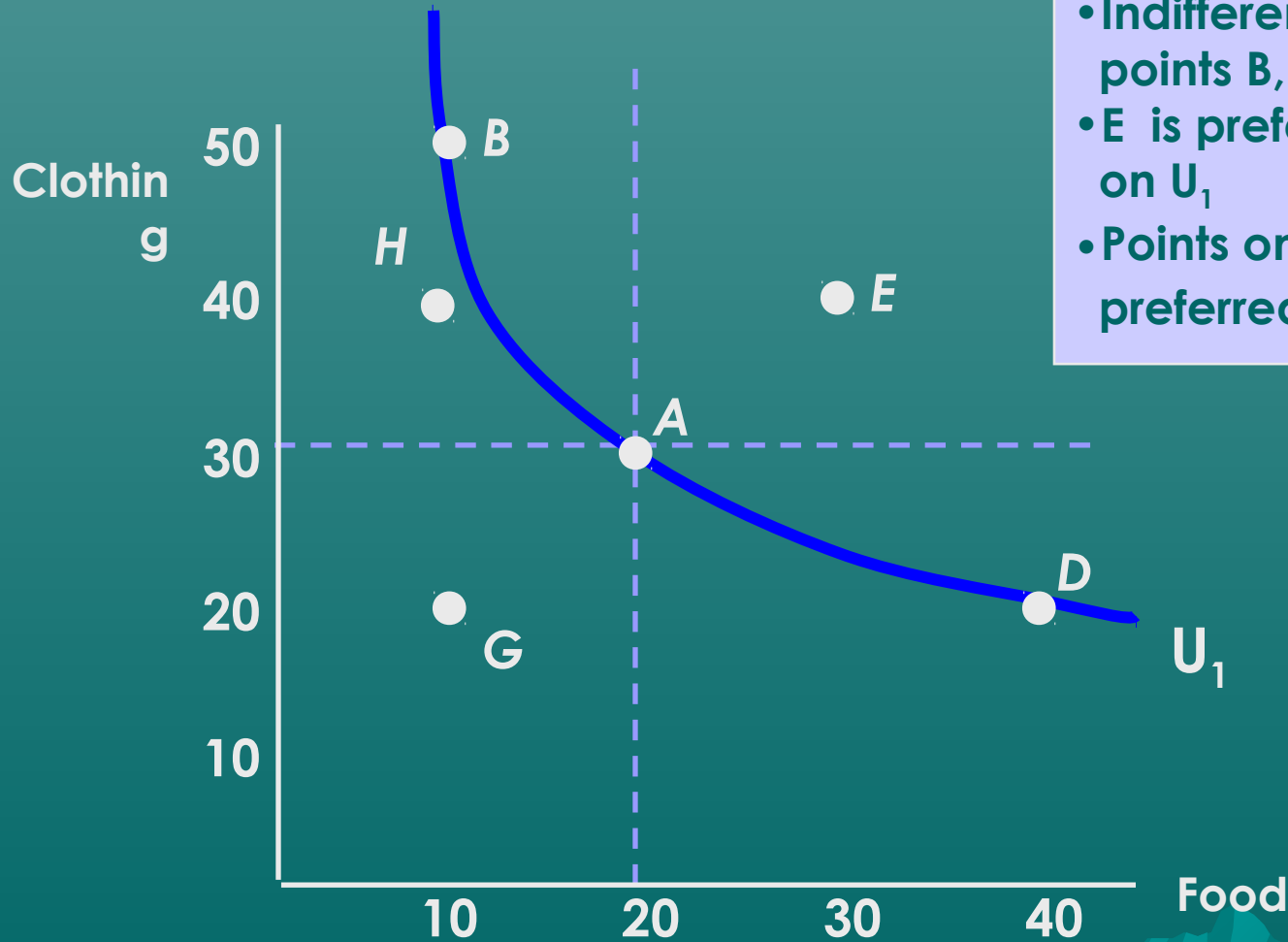


The consumer prefers A to all combinations in the yellow box, while all those in the pink box are preferred to A.

# Indifference Curves: An Example

- ◆ Graph the points with one good on the x-axis and one good on the y-axis
- ◆ Plotting the points, we can make some immediate observations about preferences
  - More is better
- ◆ Points such as B & D have more of one good but less of another compared to A
  - Need more information about consumer ranking
- ◆ Consumer may decide they are indifferent between B, A and D
  - We can then connect those points with an indifference curve

# Indifference Curves: An Example



- Indifferent between points B, A, & D
- E is preferred to points on  $U_1$
- Points on  $U_1$  are preferred to H & G

# Indifference Curves

- ◆ Any market basket lying northeast of an indifference curve is preferred to any market basket that lies on the indifference curve
- ◆ Points on the curve are preferred to points southwest of the curve

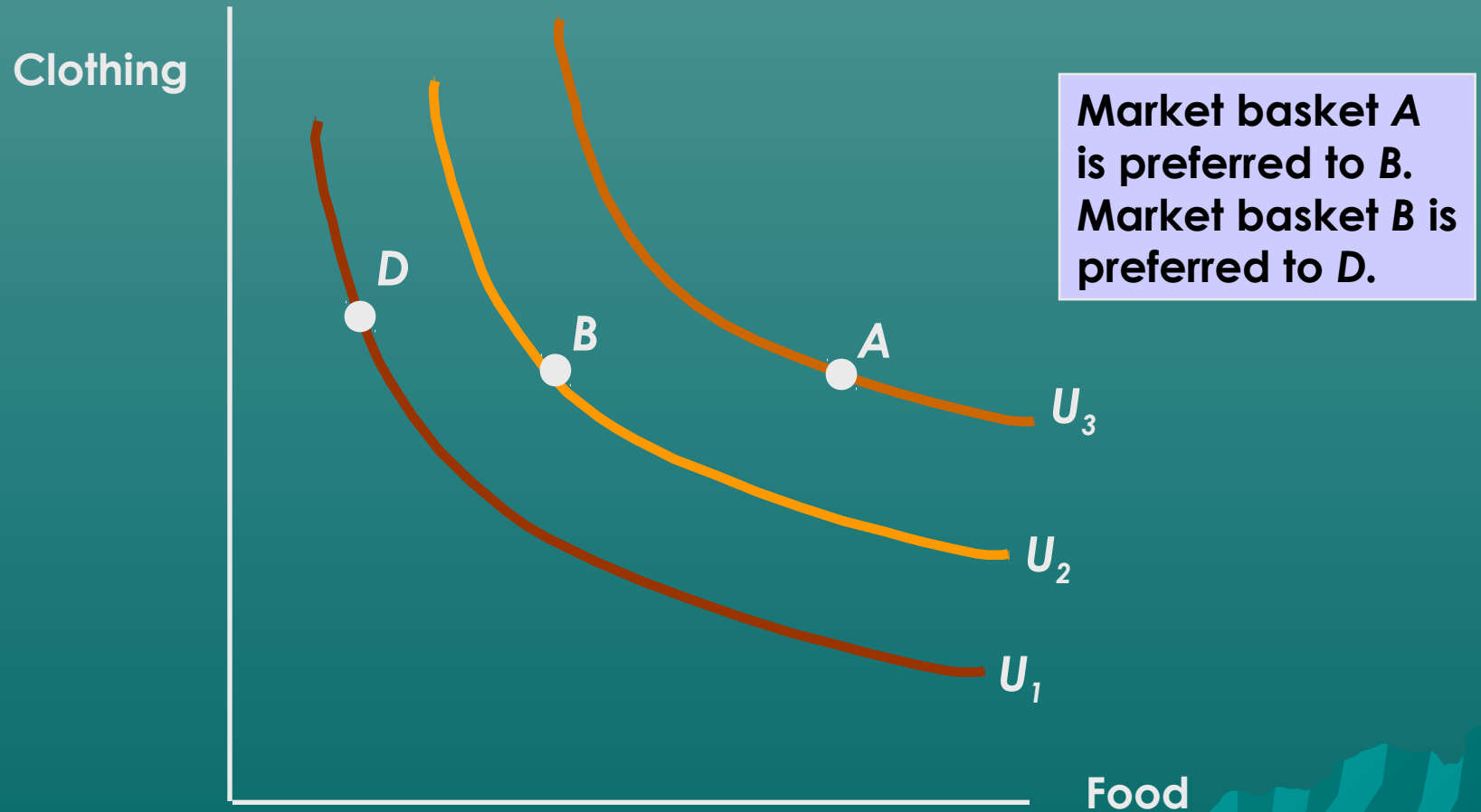
# Indifference Curves

- ◆ Indifference curves slope downward to the right
  - If they sloped upward, they would violate the assumption that more is preferred to less (*i.e., some points that had more of both goods would be indifferent to a basket with less of both goods*)

# Indifference Curves

- ◆ To describe preferences for all combinations of goods/services, we have a set of indifference curves – an *indifference map*
  - Each indifference curve in the map shows the market baskets among which the person is indifferent

# Indifference Map



# Indifference Maps

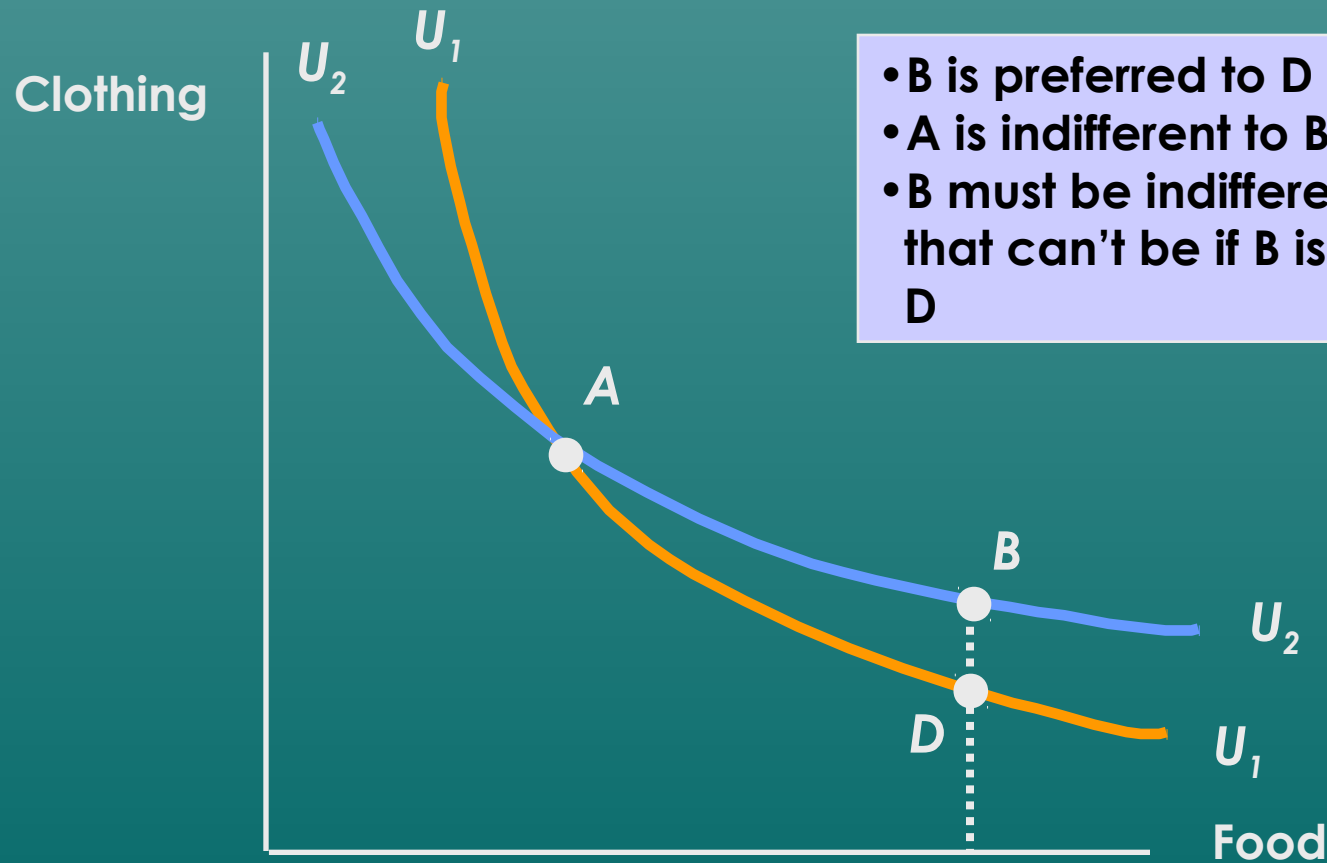
- ◆ Indifference maps give more information about shapes of indifference curves
  - Indifference curves cannot cross
  - Why? What if we assume they can cross?

Violates assumptions:

1)transitivity 2) non-satiety

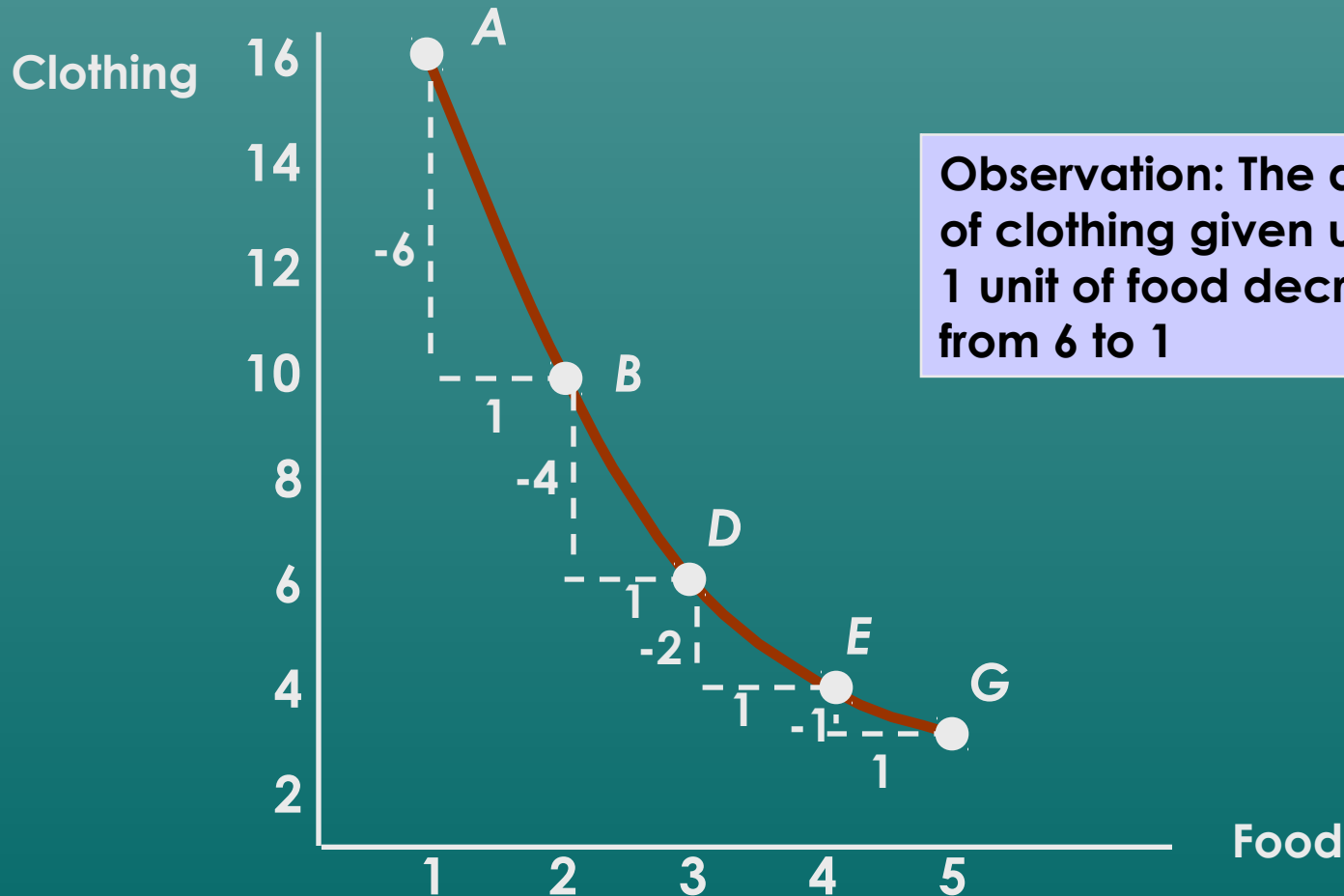


# Indifference Maps



- $B$  is preferred to  $D$
- $A$  is indifferent to  $B$  &  $D$
- $B$  must be indifferent to  $D$  but that can't be if  $B$  is preferred to  $D$

# Indifference Curves



**Observation: The amount of clothing given up for 1 unit of food decreases from 6 to 1**

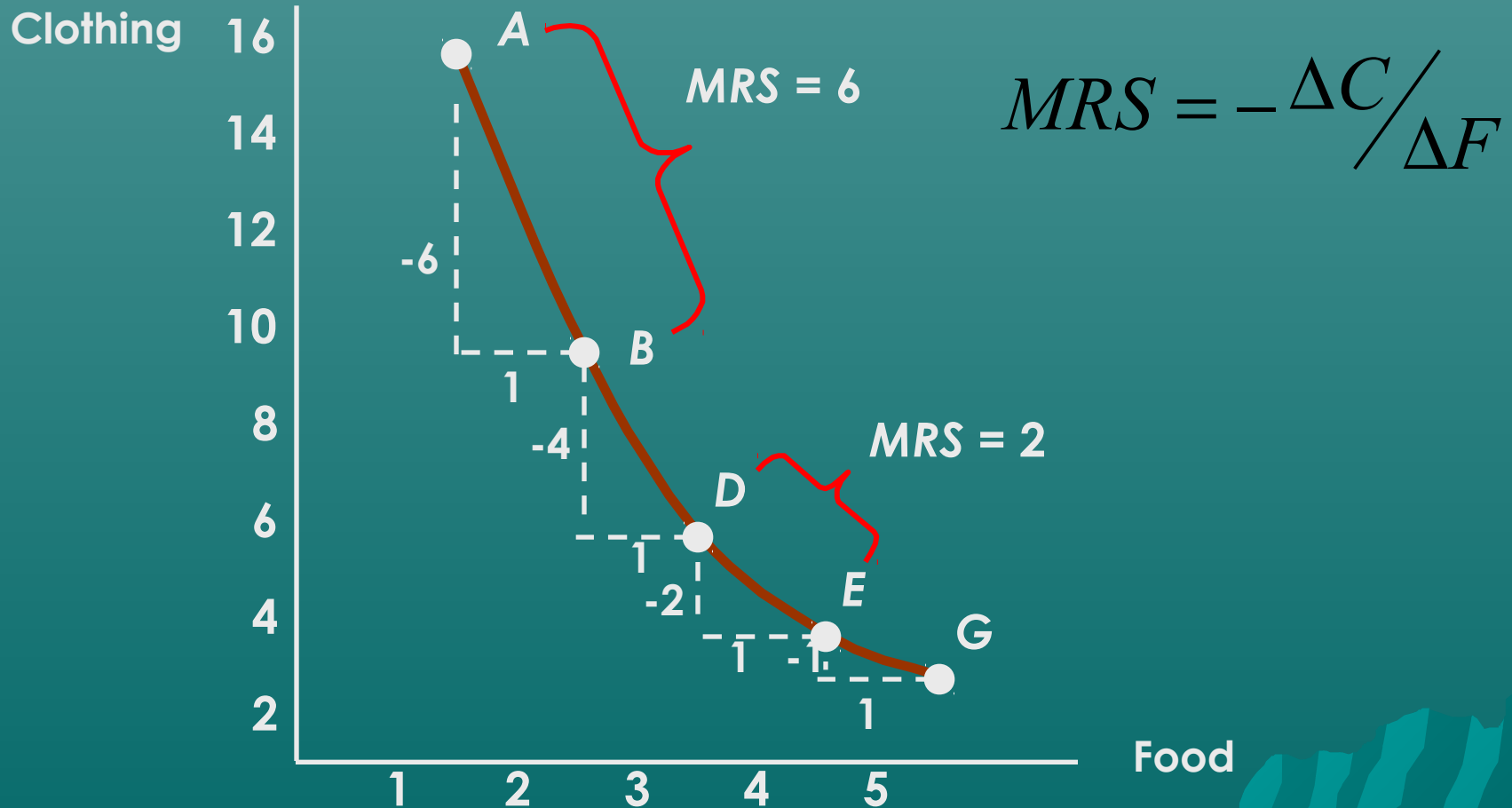
# Indifference Curves

- ◆ The shapes of indifference curves describe how a consumer is willing to substitute one good for another
  - A to B, give up 6 clothing to get 1 food
  - D to E, give up 2 clothing to get 1 food
- ◆ The more clothing and less food a person has, the more clothing they will give up to get more food

# Indifference Curves

- ◆ We measure how a person trades one good for another using the *marginal rate of substitution (MRS)*
  - It quantifies the amount of one good a consumer will give up to obtain more of another good
  - It is measured by the slope of the indifference curve

# Marginal Rate of Substitution



# Marginal Rate of Substitution

- ◆ Indifference curves are convex
  - As more of one good is consumed, a consumer would prefer to give up fewer units of a second good to get additional units of the first one
- ◆ Consumers generally prefer a balanced market basket

# Marginal Rate of Substitution

- ◆ The MRS decreases as we move down the indifference curve
  - Along an indifference curve there is a *diminishing marginal rate of substitution*.
  - The MRS decreased from 6 to 4 to 1

# Properties of Indifference Curves

- ◆ Indifference curves are negatively sloped
- ◆ Indifference curves are convex to origin
- ◆ Indifference curves never intersect
- ◆ Higher/upper indifference curve represents higher utility



# Marginal Rate of Substitution

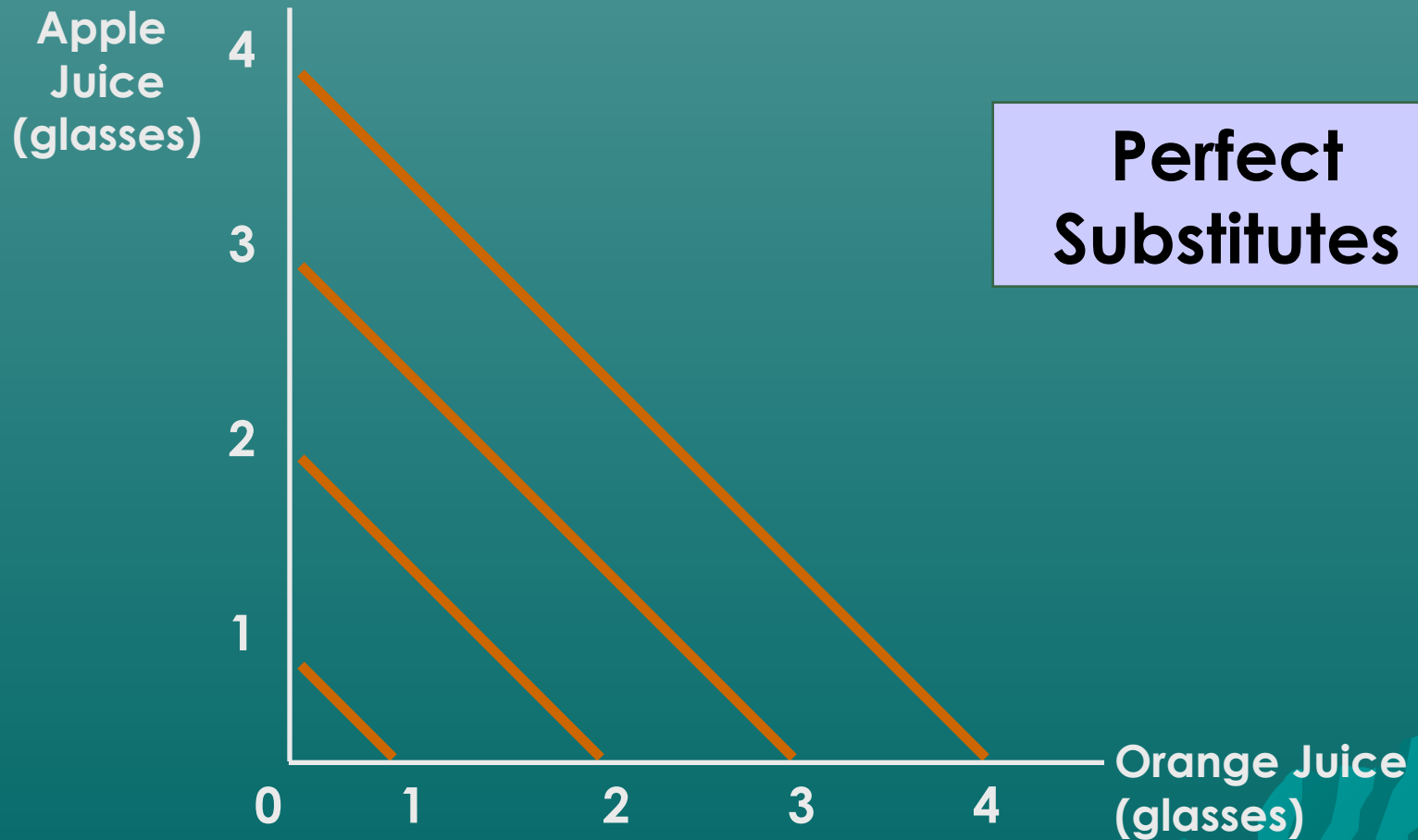
- ◆ Indifference curves with different shapes imply a different willingness to substitute
- ◆ Two polar cases are of interest
  - Perfect substitutes
  - Perfect complements

# Marginal Rate of Substitution

## ◆ Perfect Substitutes

- Two goods are perfect substitutes when the marginal rate of substitution of one good for the other is constant
- Example: a person might consider apple juice and orange juice perfect substitutes (*i.e., always 1 glass of OJ is traded for 1 glass of Apple Juice*)

# Consumer Preferences



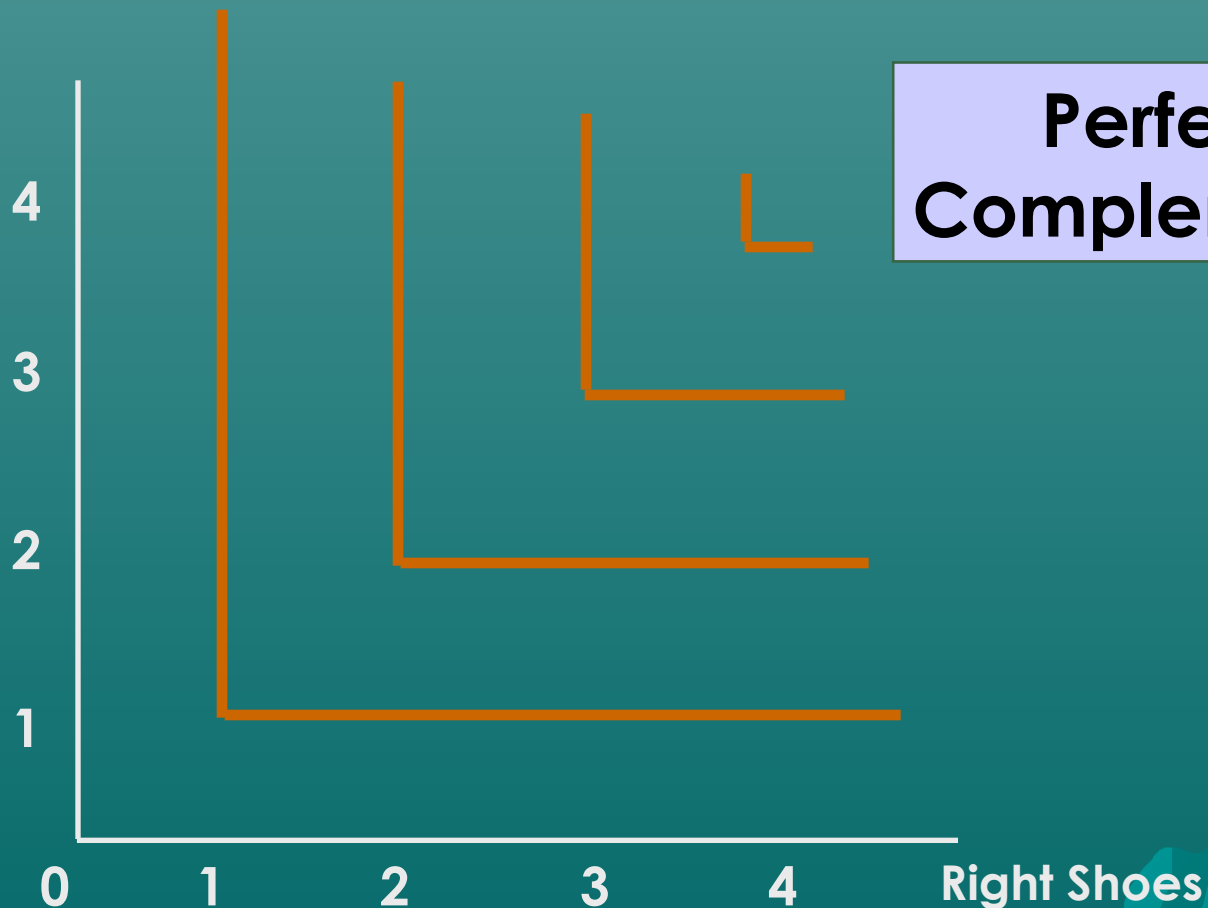
# Consumer Preferences

## ◆ Perfect Complements

- Two goods are perfect complements when the indifference curves for the goods are shaped as right angles
- Example: If you have 1 left shoe and 1 right shoe, you are indifferent between having more left shoes only  
(i.e., must have one right for one left)

# Consumer Preferences

Left Shoes



**Perfect  
Complements**

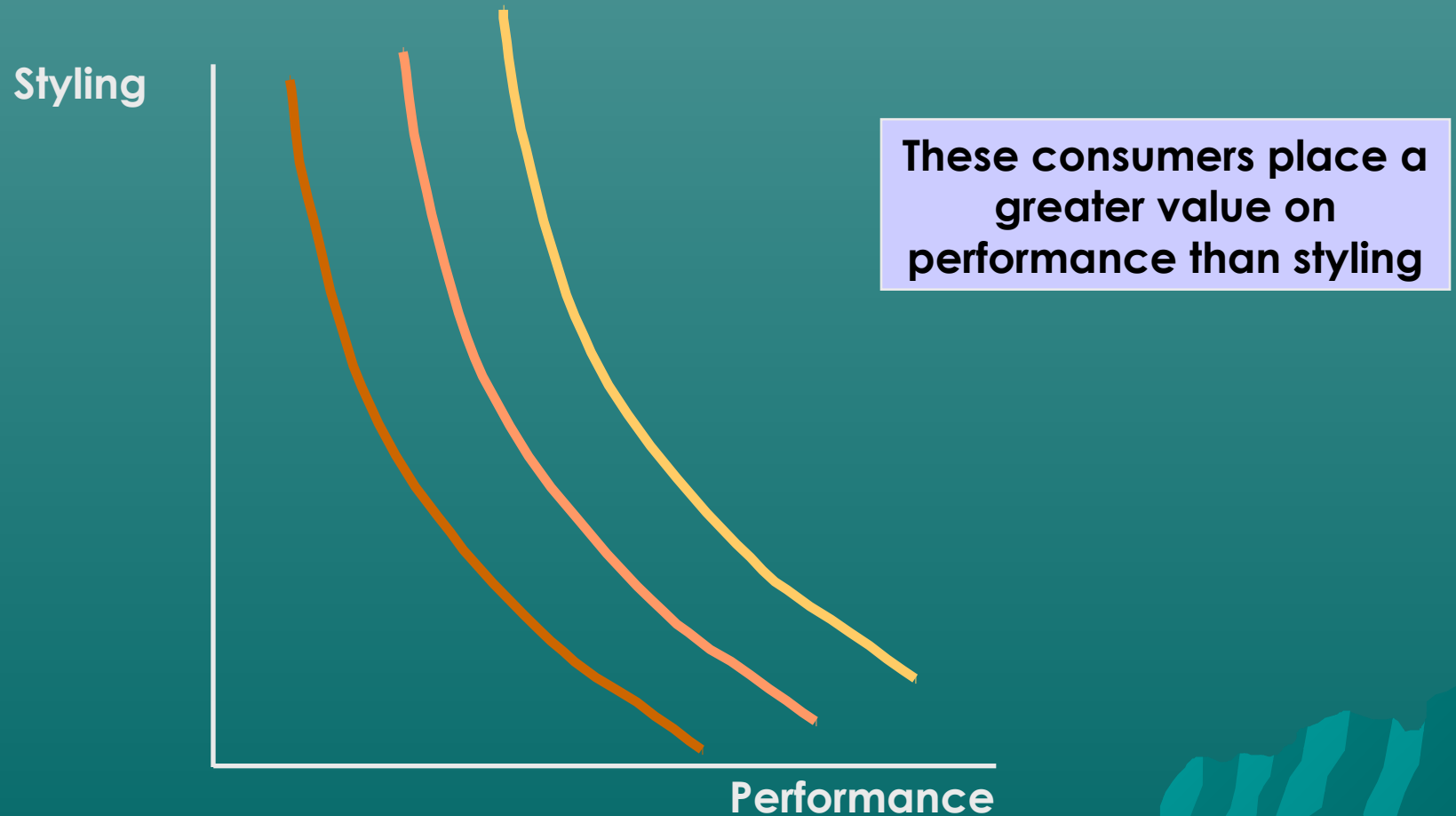
# Consumer Preferences: An Application

- ◆ In designing new cars, automobile executives must determine how much time and money to invest in restyling versus increased performance
  - Higher demand for car with better styling and performance
  - Both cost more to improve

# Consumer Preferences: An Application

- ◆ An analysis of consumer preferences would help to determine where to spend more on change: performance or styling
- ◆ Some consumers will prefer better styling and some will prefer better performance

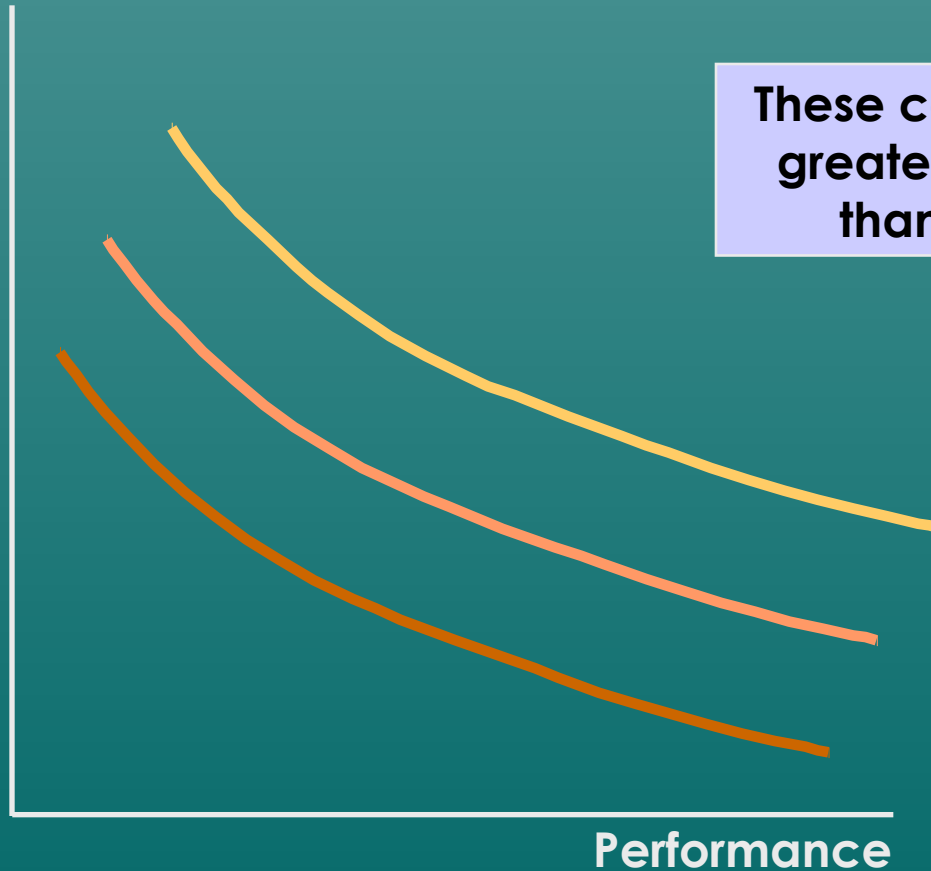
# Consumer Preferences: An Application





# Consumer Preferences: An Application

Styling



**These consumers place a greater value on styling than performance**

Performance

# Consumer Preferences: An Application

Knowing which group dominates the market will help decide where redesigning expenditure should go

# Consumer Preferences

- ◆ The theory of consumer behavior does not required assigning a numerical value to the level of satisfaction
- ◆ Although ranking of market baskets is good, sometimes numerical value is useful

# Consumer Preferences

## ◆ Utility

- A numerical score representing the satisfaction that a consumer gets from a given market basket
- If buying 3 copies of *Microeconomics* makes you happier than buying one shirt, then we say that the books give you more utility than the shirt

# Utility

- ◆ There are two types of rankings
  - Ordinal ranking
  - Cardinal ranking

# Utility

## ◆ *Ordinal Utility Function*

- Places market baskets in the order of most preferred to least preferred, but it does not indicate how much one market basket is preferred to another

## ◆ *Cardinal Utility Function*

- Utility function describing the extent to which one market basket is preferred to another

# Utility

## ◆ *Utility function*

- Formula that assigns a level of utility to individual market baskets
- If the utility function is

$$U(F,C) = F + 2C$$

A market basket with 8 units of food and 3 units of clothing gives a utility of

$$14 = 8 + 2(3)$$

# Utility - Example

Market Basket	Food	Clothing	Utility
A	8	3	$8 + 2(3) = 14$
B	6	4	$6 + 2(4) = 14$
C	4	4	$4 + 2(4) = 12$

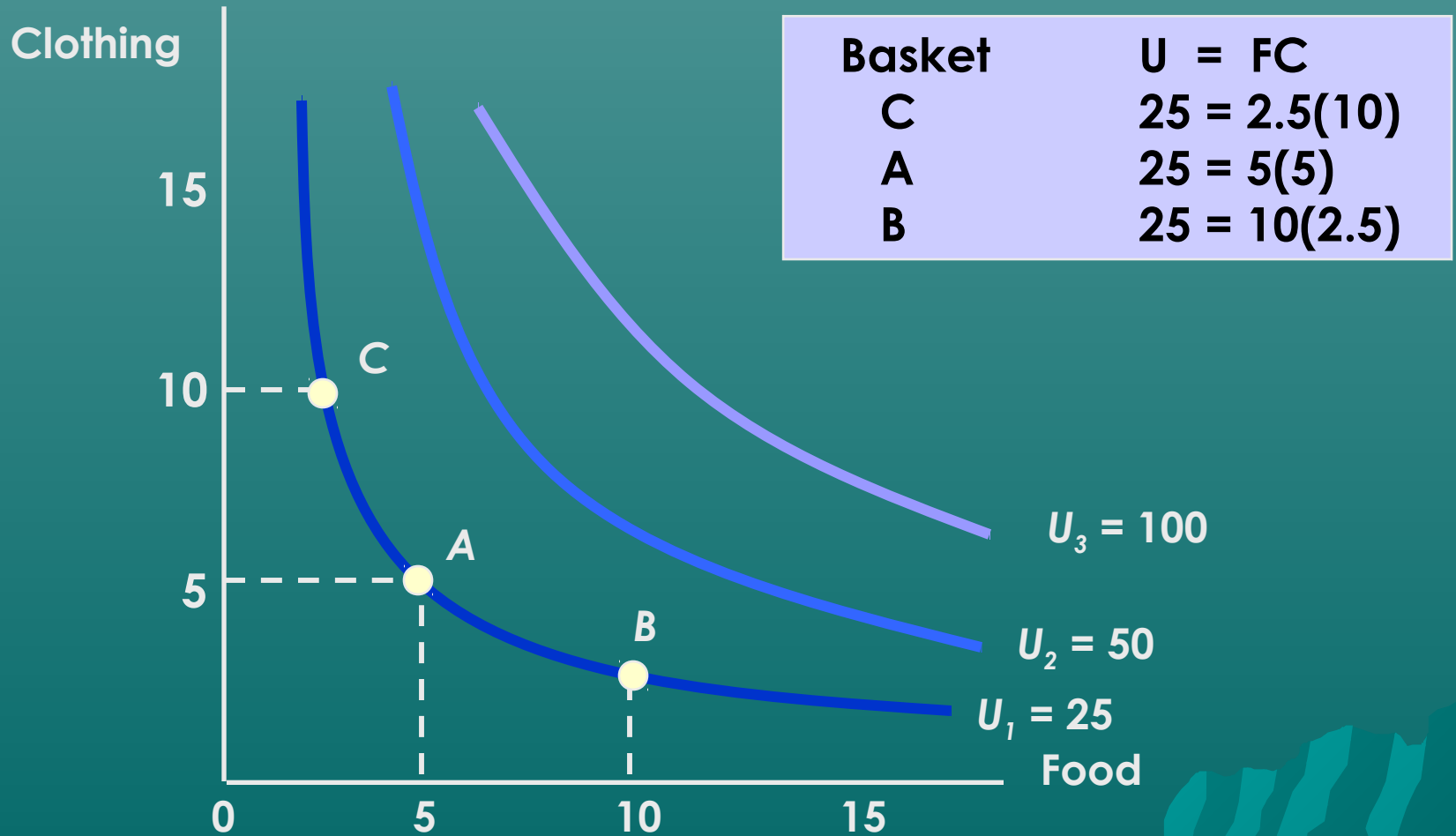
Consumer is indifferent between A & B and prefers both to C



# Utility - Example

- ◆ Baskets for each level of utility can be plotted to get an indifference curve
  - To find the indifference curve for a utility of 14, we can change the combinations of food and clothing that give us a utility of 14

# Utility - Example



# Utility

- ◆ The actual unit of measurement for utility is not important
- ◆ An ordinal ranking is sufficient to explain how most individual decisions are made

# Budget Constraints

- ◆ Preferences do not explain all of consumer behavior
- ◆ Budget constraints also limit an individual's ability to consume in light of the prices they must pay for various goods and services

# Budget Constraints

## ◆ *The Budget Line*

- Indicates all combinations of two commodities for which total money spent equals total income
- We assume only 2 goods are consumed, so we do not consider savings

# The Budget Line

- ◆ Let  $F$  equal the amount of food purchased, and  $C$  is the amount of clothing
- ◆ Price of food =  $P_f$  and price of clothing =  $P_c$
- ◆ Then  $P_f F$  is the amount of money spent on food, and  $P_c C$  is the amount of money spent on clothing

# The Budget Line

- ◆ The budget line then can be written:

$$P_F F + P_C C = I$$

All income is allocated to food (F) and/or clothing (C)

# The Budget Line

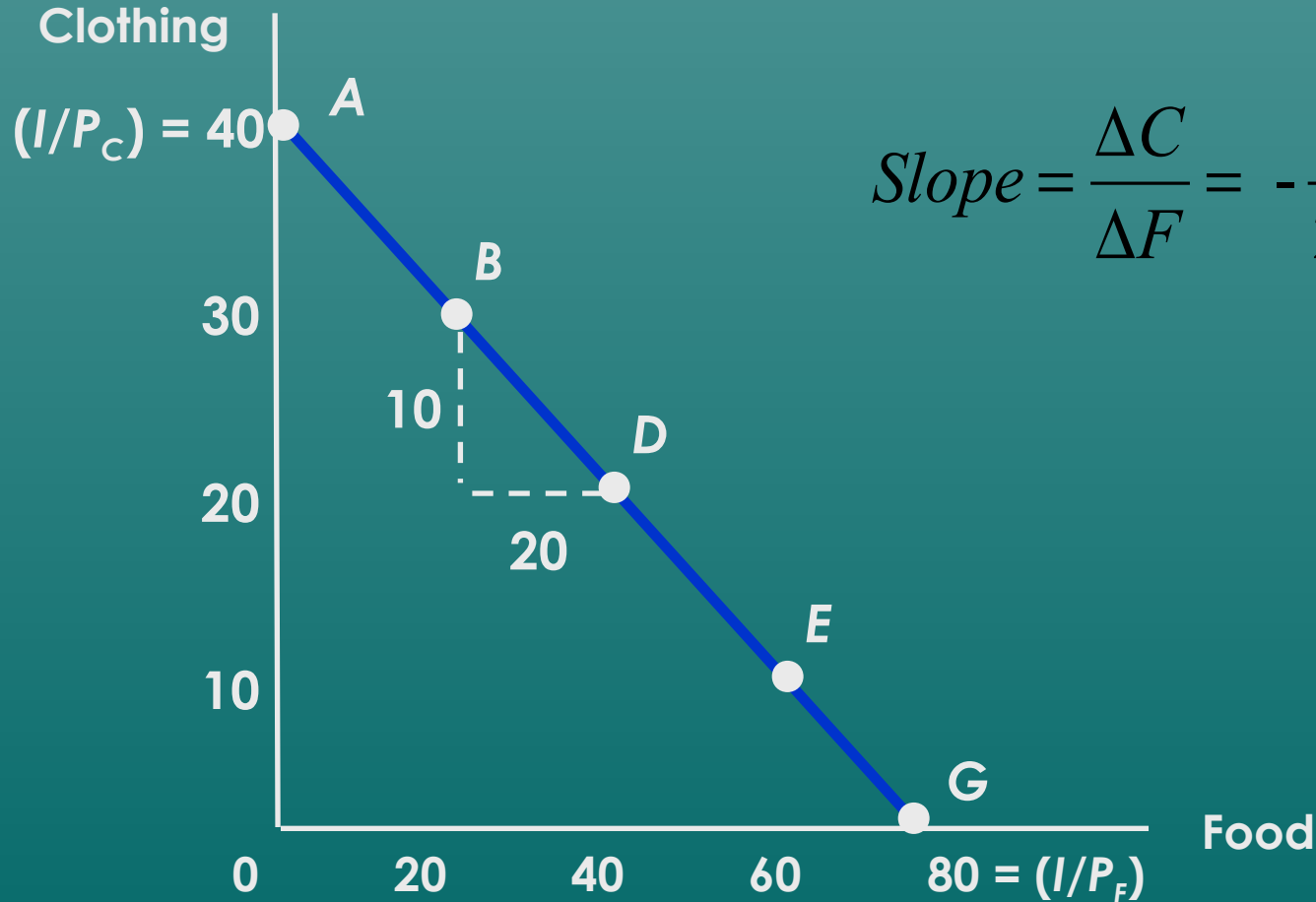
- ◆ Different choices of food and clothing can be calculated that use all income
  - These choices can be graphed as the budget line
- ◆ Example:
  - Assume income of \$80/week,  $P_f = \$1$  and  $P_c = \$2$



# Budget Constraints

Market Basket	Food $P_F = \$1$	Clothing $P_C = \$2$	Income $I = P_F F + P_C C$
A	0	40	\$80
B	20	30	\$80
D	40	20	\$80
E	60	10	\$80
G	80	0	\$80

# The Budget Line



$$\text{Slope} = \frac{\Delta C}{\Delta F} = -\frac{1}{2} = -\frac{P_F}{P_C}$$

# The Budget Line

- ◆ As consumption moves along a budget line from the intercept, the consumer spends less on one item and more on the other
- ◆ The slope of the line measures the relative cost of food and clothing
- ◆ The slope is the negative of the ratio of the prices of the two goods

# The Budget Line

- ◆ The slope indicates the rate at which the two goods can be substituted without changing the amount of money spent
- ◆ We can rearrange the budget line equation to make this more clear

# The Budget Line

$$I = P_X X + P_Y Y$$

$$I - P_X X = P_Y Y$$

$$\frac{I}{P_Y} - \frac{P_X}{P_Y} X = Y$$

# Budget Constraints

## ◆ The Budget Line

- The vertical intercept,  $I/P_C$ , illustrates the maximum amount of C that can be purchased with income I
- The horizontal intercept,  $I/P_F$ , illustrates the maximum amount of F that can be purchased with income I

# The Budget Line

- ◆ As we know, income and prices can change
- ◆ As incomes and prices change, there are changes in budget lines
- ◆ We can show the effects of these changes on budget lines and consumer choices

# The Budget Line - Changes

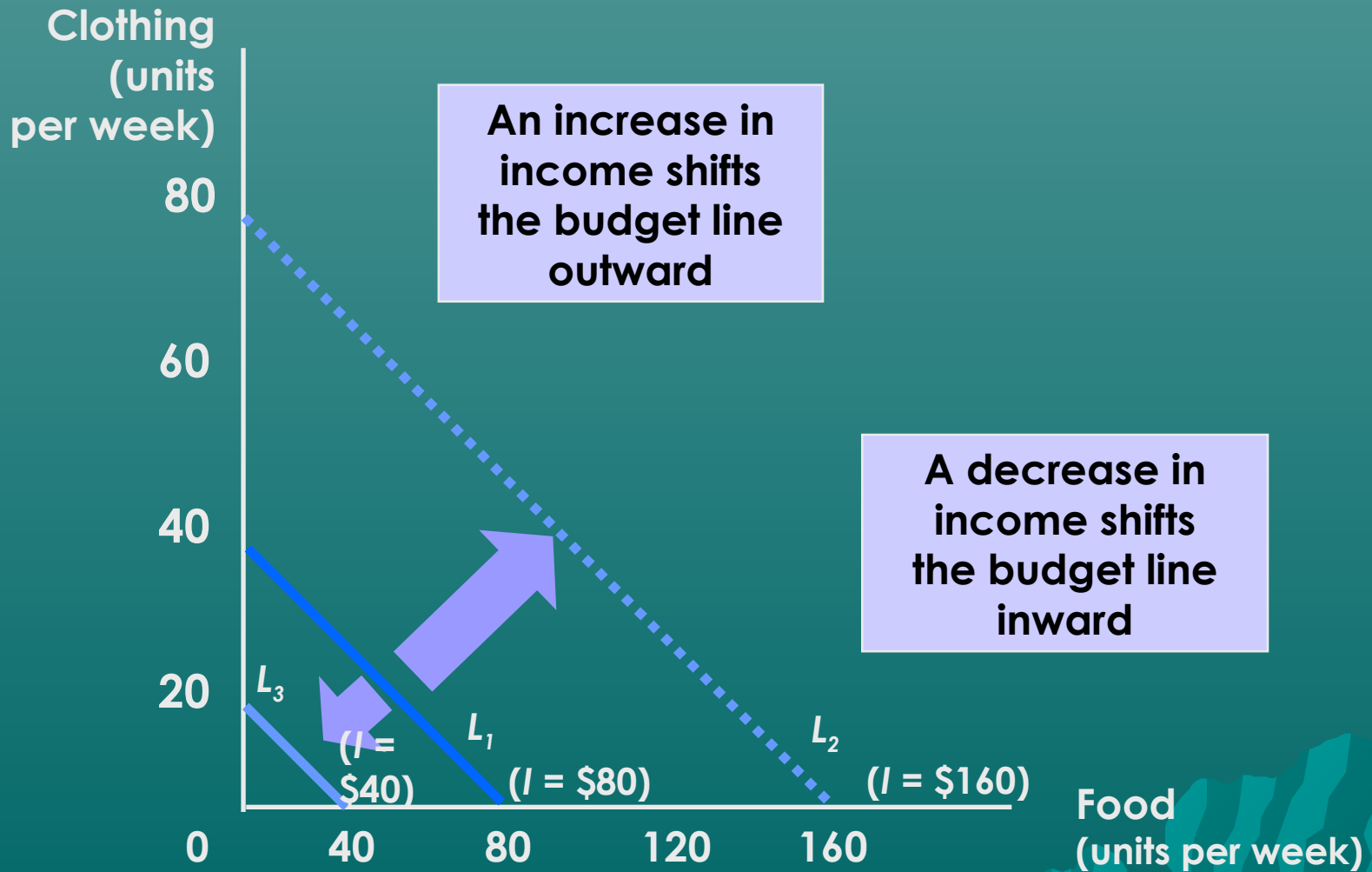
- ◆ The Effects of Changes in Income
  - An increase in income causes the budget line to shift outward, parallel to the original line (holding prices constant).
  - Can buy more of both goods with more income



# The Budget Line - Changes

- ◆ The Effects of Changes in Income
  - A decrease in income causes the budget line to shift inward, parallel to the original line (holding prices constant)
  - Can buy less of both goods with less income

# The Budget Line - Changes



# The Budget Line - Changes

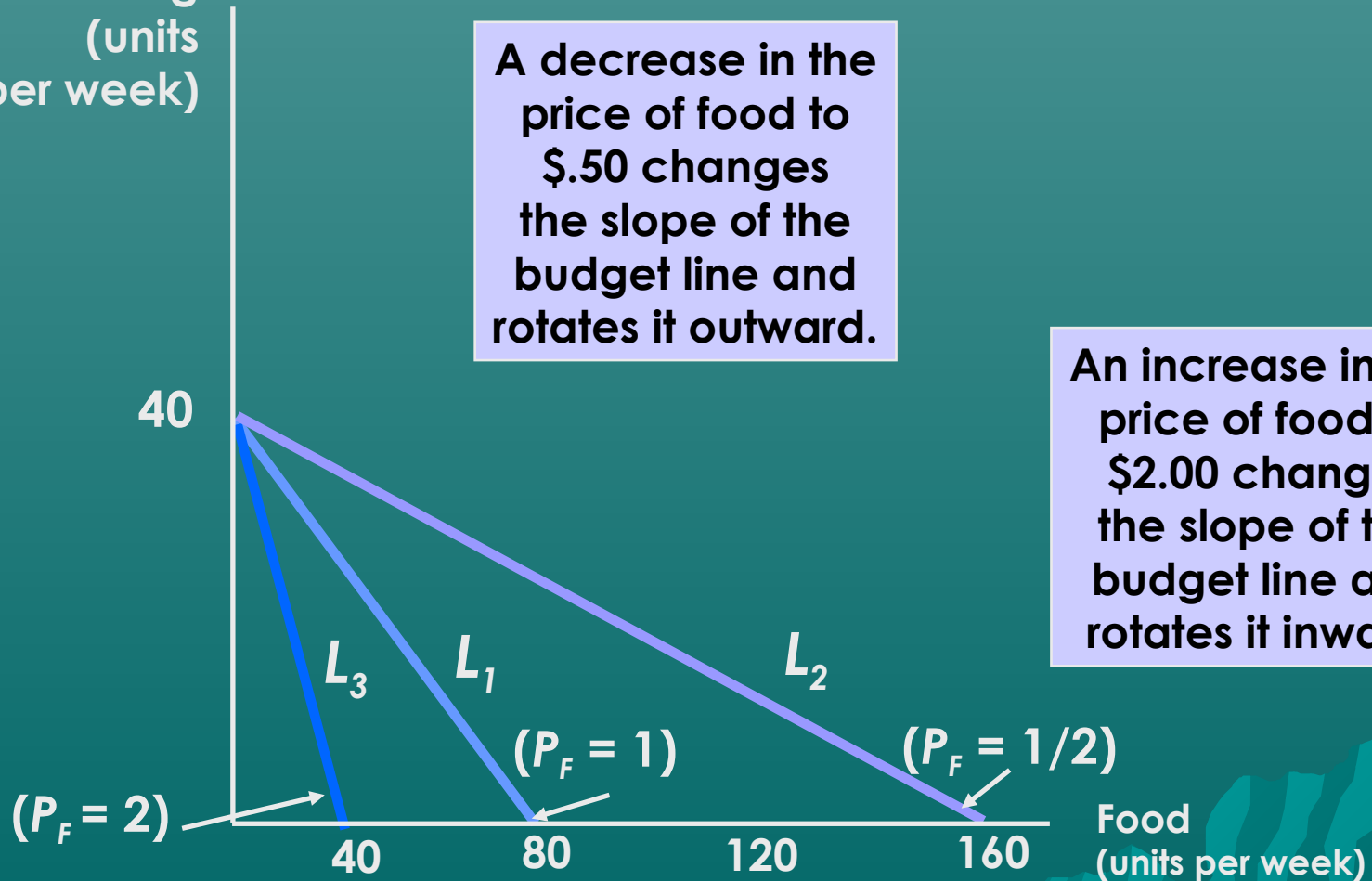
- ◆ The Effects of Changes in Prices
  - If the price of one good increases, the budget line shifts inward, pivoting from the other good's intercept.
  - If the price of food increases and you buy only food (x-intercept), then you can't buy as much food. The x-intercept shifts in.
  - If you buy only clothing (y-intercept), you can buy the same amount. No change in y-intercept.

# The Budget Line - Changes

- ◆ The Effects of Changes in Prices
  - If the price of one good decreases, the budget line shifts outward, pivoting from the other good's intercept.
  - If the price of food decreases and you buy only food (x-intercept), then you can buy more food. The x-intercept shifts out.
  - If you buy only clothing (y-intercept), you can buy the same amount. No change in y-intercept.

# The Budget Line - Changes

Clothing  
(units  
per week)



# The Budget Line - Changes

- ◆ The Effects of Changes in Prices
  - If prices of both the two goods increase, but the ratio of the two prices is unchanged, the slope will not change
  - However, the budget line will shift inward parallel to the original budget line

# The Budget Line - Changes

- ◆ The Effects of Changes in Prices
  - If the prices of both the goods decrease, but the ratio of the two prices is unchanged, the slope will not change
  - However, the budget line will shift outward parallel to the original budget line

# Consumer Choice

- ◆ Given preferences and budget constraints, how do consumers choose what to buy?
- ◆ Consumers choose a combination of goods that will maximize their satisfaction, given the limited budget available to them



# Consumer Choice

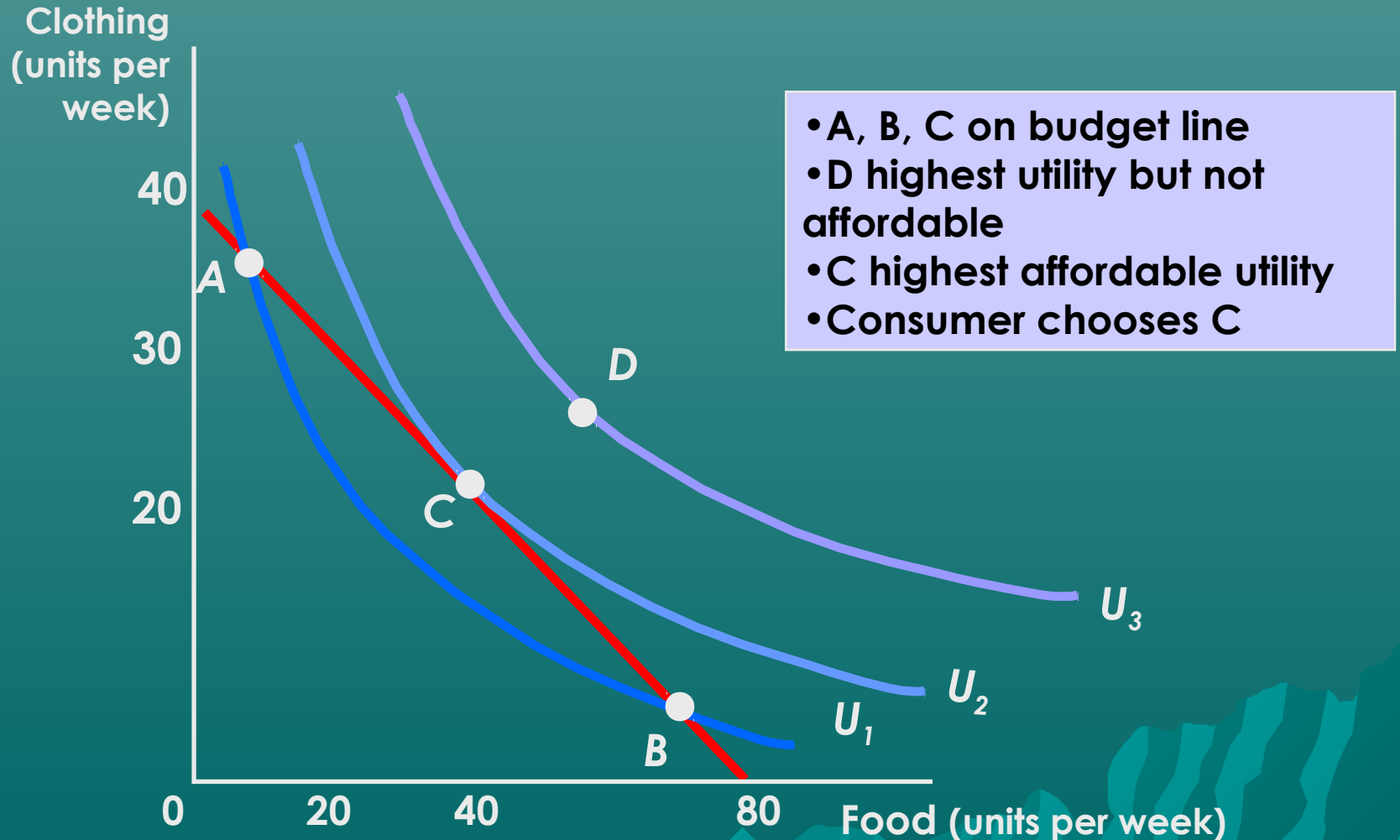
The maximizing market basket must satisfy two conditions:

1. It must be located on the budget line
  - They spend all their income – more is better
2. It must give the consumer the most preferred combination of goods and services

# Consumer Choice

- ◆ Graphically, we can see different indifference curves of a consumer choosing between clothing and food
- ◆ Remember that  $U_3 > U_2 > U_1$  for our indifference curves
- ◆ Consumer wants to choose highest utility within their budget

# Consumer Choice



# Consumer Choice

- ◆ Consumer will choose highest indifference curve on budget line
- ◆ In previous graph, point C is where the indifference curve is just tangent to the budget line
- ◆ Slope of the budget line equals the slope of the indifference curve at this point

# Consumer Choice

- ◆ Recall, the slope of an indifference curve:

$$MRS = -\frac{\Delta C}{\Delta F}$$

Further, the slope of the budget line:

$$Slope = -\frac{P_F}{P_C}$$

# Consumer Choice

- ◆ Therefore, it can be said at consumer's optimal consumption point,

$$MRS = \frac{P_F}{P_C}$$

# Consumer Choice

- ◆ It can be said that satisfaction is maximized when *marginal rate of substitution (of F and C) is equal to the ratio of the prices (of F and C)*
- ◆ Note this is ONLY true at the optimal consumption point

# Consumer Choice

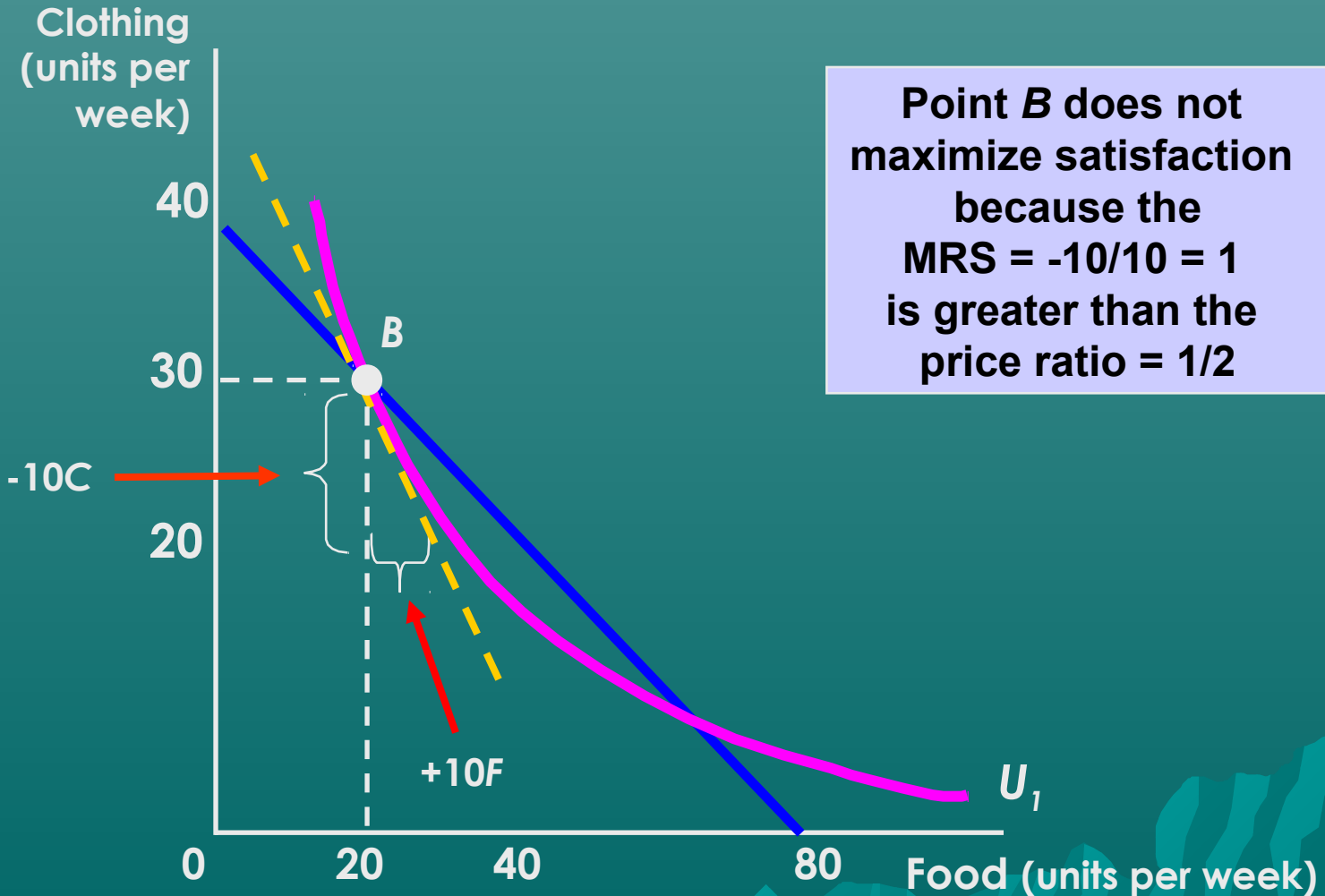
- ◆ Optimal consumption point is where marginal benefits equal marginal costs
- ◆  $MB = MRS =$  benefit associated with consumption of 1 more unit of food
- ◆  $MC =$  cost of additional unit of food
  - 1 unit food =  $\frac{1}{2}$  unit clothing
  - $P_F/P_C$



# Consumer Choice

- ◆ If  $MRS \neq P_F/P_C$  then individuals can reallocate basket to increase utility
- ◆ If  $MRS > P_F/P_C$ 
  - Will increase food and decrease clothing until  $MRS = P_F/P_C$
- ◆ If  $MRS < P_F/P_C$ 
  - Will increase clothing and decrease food until  $MRS = P_F/P_C$

# Consumer Choice



# Marginal Utility and Consumer Choice

- ◆ *Marginal utility* measures the additional satisfaction obtained from consuming one additional unit of a good
  - How much happier is the individual from consuming one more unit of food?

# Marginal Utility - Example

No. of units	Total utility (TU)	Marginal utility (MU)
1	30	30
2	50	20
3	60	10
4	65	5
5	60	-5
6	45	-15

**Observation: Marginal utility is diminishing as consumption increases**

# Marginal Utility

- ◆ The principle of *diminishing marginal utility* states that as more of a good is consumed, the additional utility the consumer gains will be smaller and smaller
- ◆ Note that total utility will continue to increase since consumer makes choices that make them happier

# Marginal Utility and Indifference Curves

- ◆ As consumption moves along an indifference curve:
  - Additional utility derived from an increase in the consumption one good, food (F), must balance the loss of utility from the decrease in the consumption in the other good, clothing (C)

# Marginal Utility and Consumer Choice

◆ Formally:

$$0 = MU_F(\Delta F) + MU_C(\Delta C)$$

No change in total utility along an indifference curve.  
Trade off of one good to the other leaves the consumer just as well off.

# Marginal Utility and Consumer Choice

## ◆ Rearranging:

$$-\left(\Delta C / \Delta F\right) = MU_F / MU_C$$

*Since*

$$-\left(\Delta C / \Delta F\right) = MRS \text{ of } F \text{ for } C$$

*We can say*

$$MRS = MU_F / MU_C$$



# Marginal Utility and Consumer Choice

- ◆ When consumers maximize satisfaction:

$$MRS = P_F / P_C$$

Since the MRS is also equal to the ratio of the marginal utility of consuming F and C

$$MU_F / MU_C = P_F / P_C$$

# Marginal Utility and Consumer Choice

- ◆ Rearranging, gives the equation for utility maximization:

$$MU_F / P_F = MU_C / P_C$$

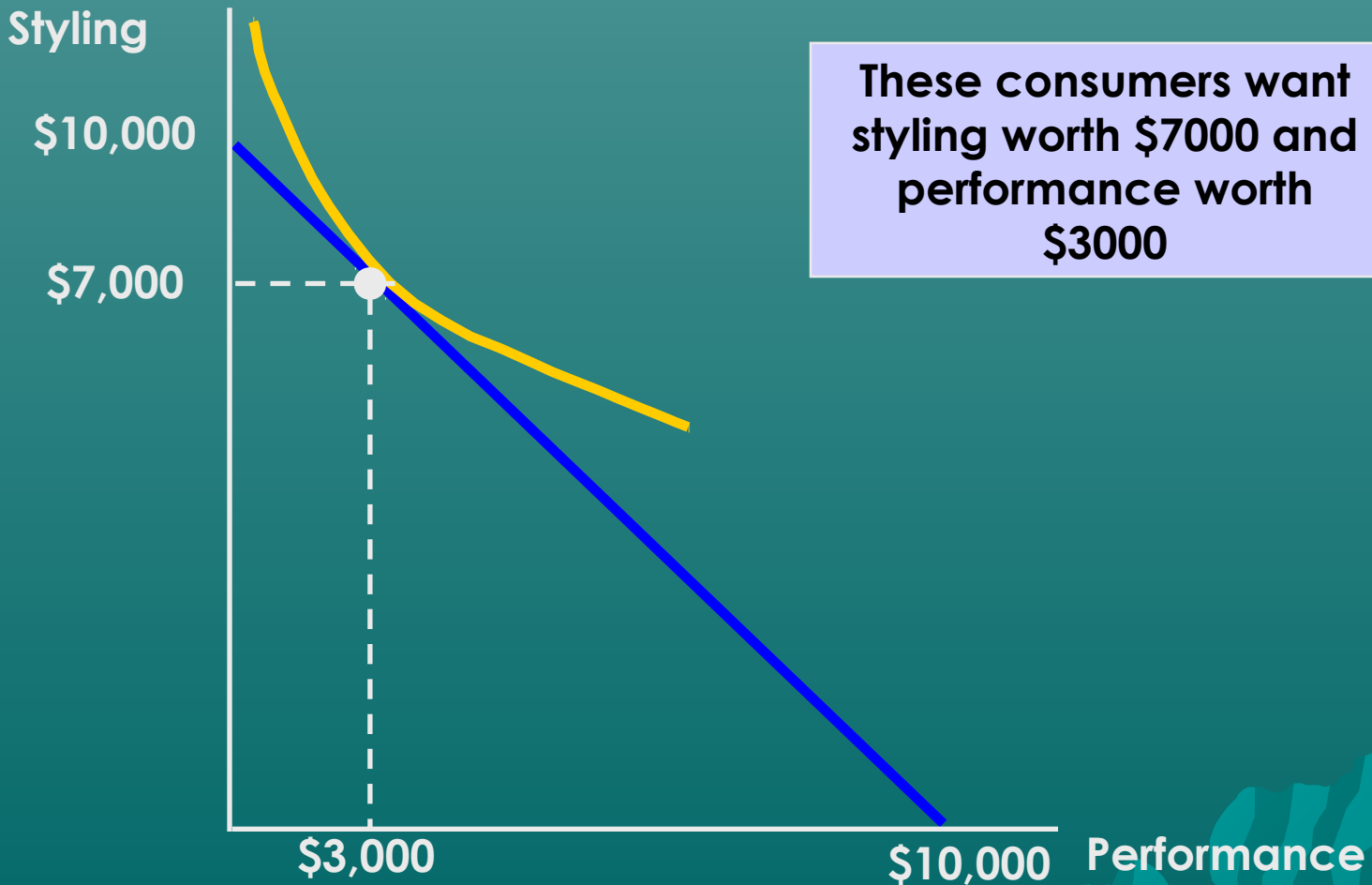
# Consumer Choice: An Application Revisited

- ◆ Consider two groups of consumers, each wishing to spend \$10,000 on the styling and performance of a car
- ◆ Each group has different preferences
- ◆ By finding the point of tangency between a group's indifference curve and the budget constraint, auto companies can see how much consumers value each attribute

# Consumer Choice: An Application Revisited



# Consumer Choice: An Application Revisited



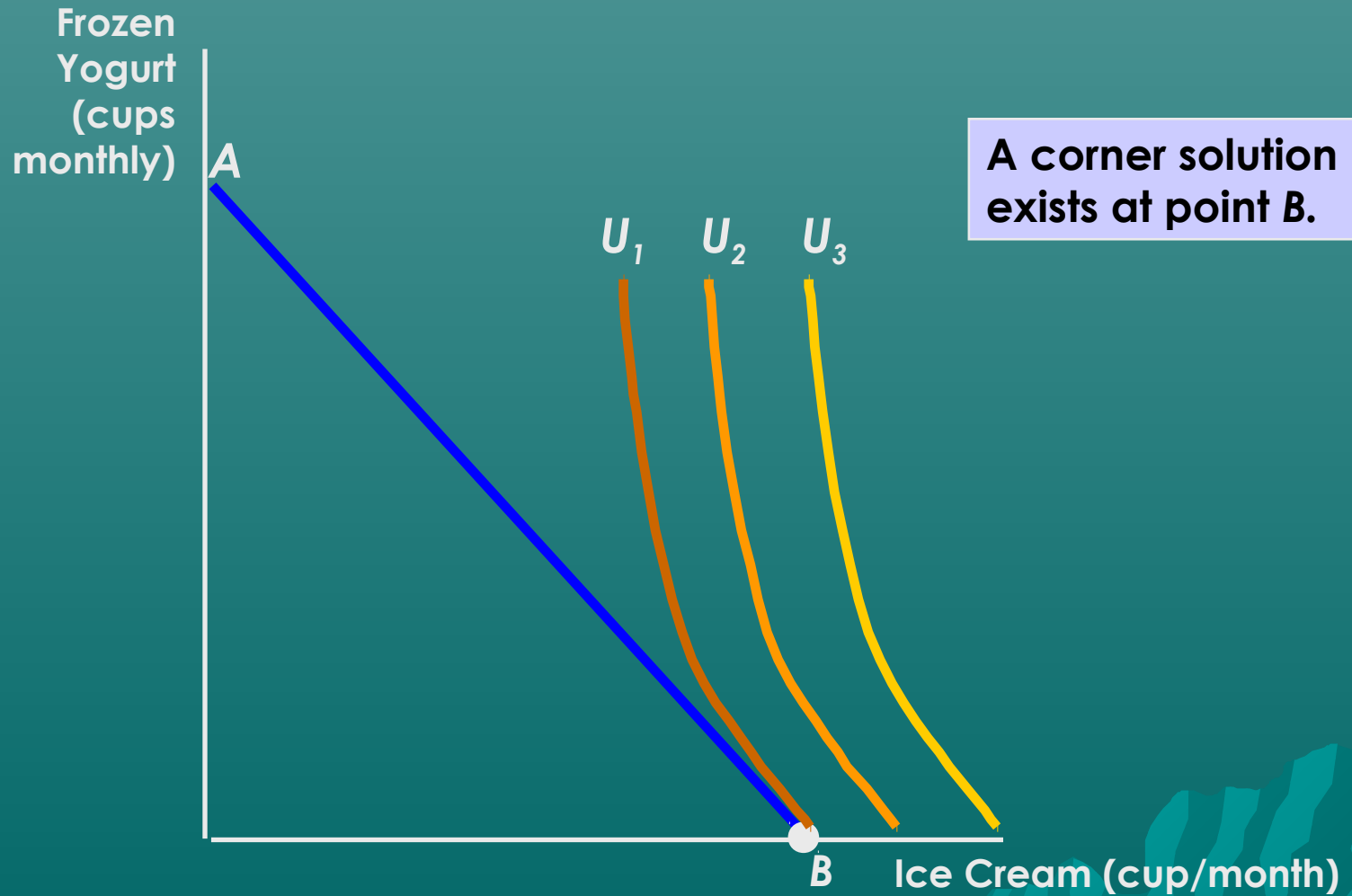
# Consumer Choice: An Application Revisited

- ◆ Once a company knows preferences, it can design a production and marketing plan
- ◆ Company can then make a sensible strategic business decision on how to allocate performance and styling on new cars

# Consumer Choice

- ◆ A *corner solution* exists if a consumer buys in extremes, and buys all of one category of good and none of another
  - MRS is **not** necessarily equal to  $P_A/P_B$

# A Corner Solution





# A Corner Solution

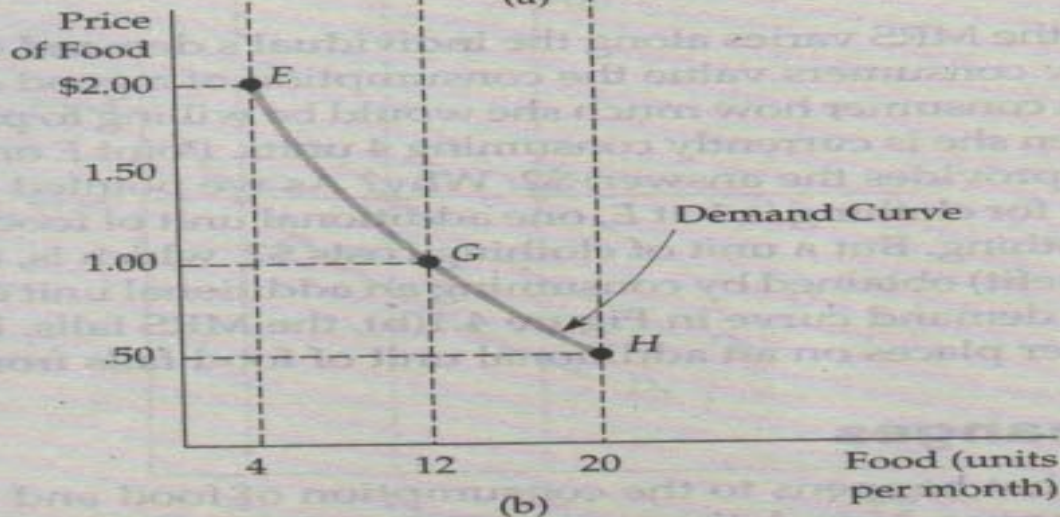
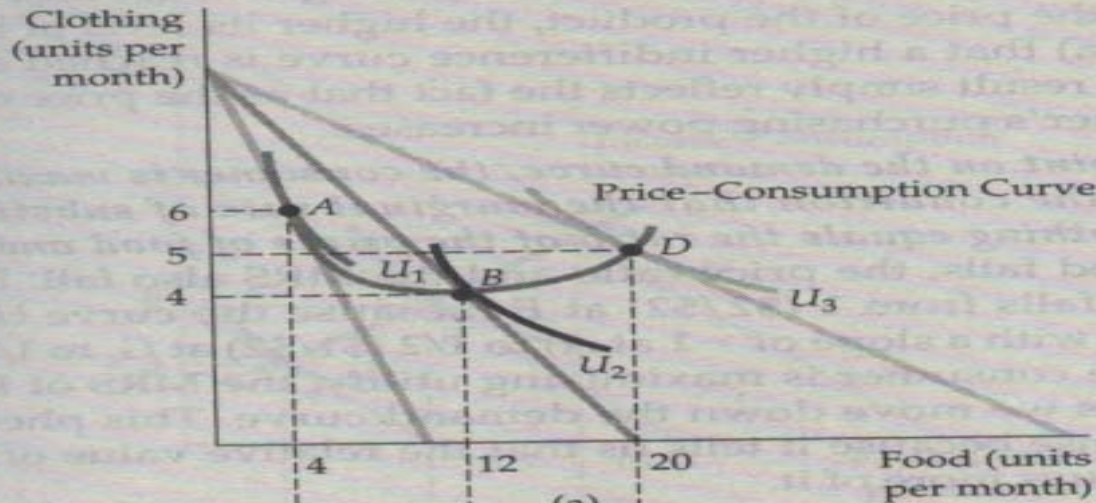
- ◆ At point B, the MRS of ice cream for frozen yogurt is greater than the slope of the budget line
- ◆ If the consumer could give up more frozen yogurt for ice cream, he would do so
- ◆ However, there is no more frozen yogurt to give up
- ◆ Opposite is true if corner solution was at point A

# A Corner Solution

- ◆ When a corner solution arises, the consumer's MRS does not necessarily equal the price ratio
- ◆ In this instance it can be said that:

$$MRS \geq \frac{P_{IceCream}}{P_{Frozen\ Yogurt}}$$

# Price Consumption Curve (PCC)



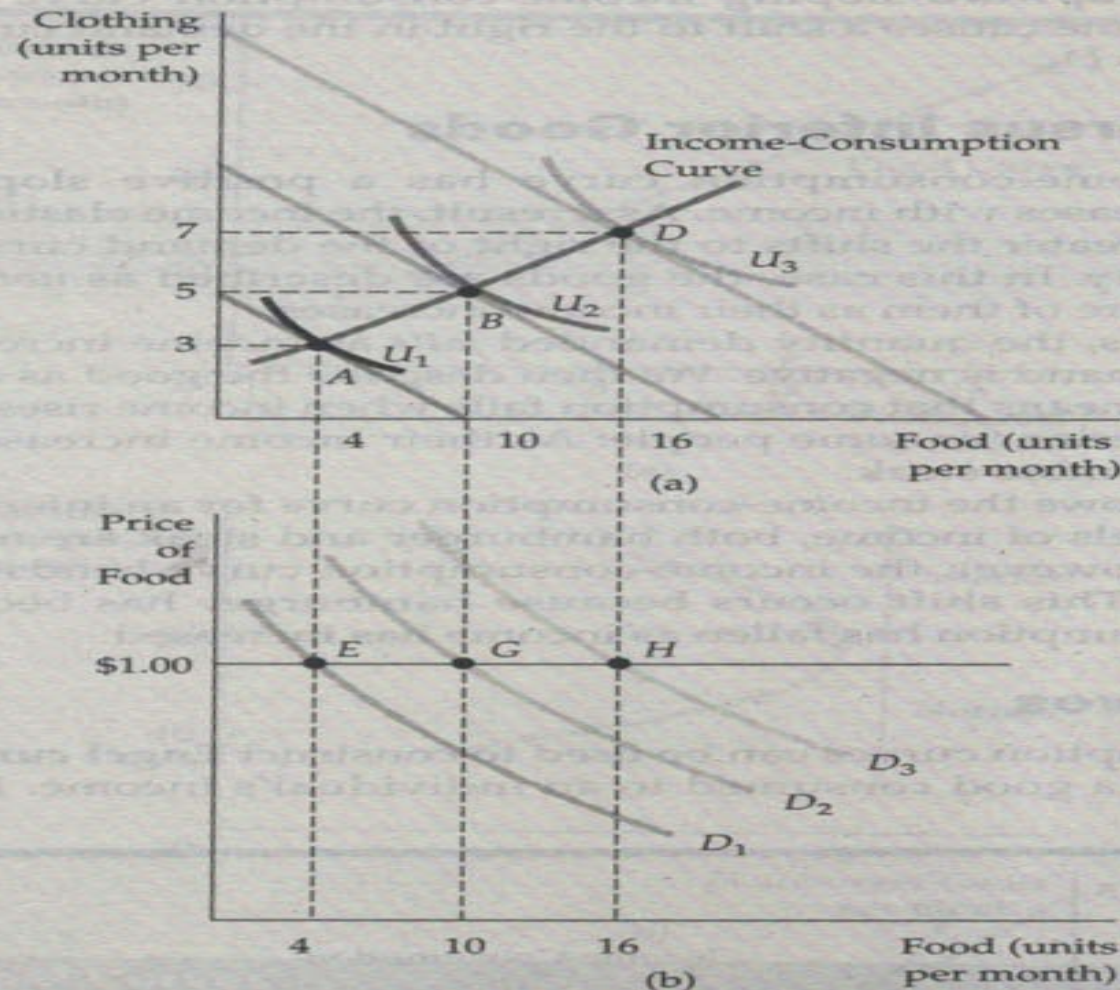
**FIGURE 4.1 Effect of Price Changes**

A reduction in the price of food, with income and the price of clothing fixed, causes this consumer to choose a different market basket. In (a), the baskets that maximize utility for various prices of food (point A, \$2; B, \$1; D, \$0.50) trace out the price-consumption curve. Part (b) gives the demand curve, which relates the price of food to the quantity demanded. (Points E, G, and H correspond to points A, B, and D, respectively.)

# PCC

PCC is the locus of points of equilibrium on ICs, resulting from the change in the price of a commodity, income and price of the other commodity remaining unchanged

# Income Consumption Curve (ICC)



**FIGURE 4.2 Effect of Income Changes**

An increase in income, with the prices of all goods fixed, causes consumers to alter their choices of market basket. In part (a), the baskets that maximize consumer satisfaction for various incomes (point A, \$10; B, \$20; D, \$30) trace out the income-consumption curve. The shift to the right of the demand curve in response to the increases in income is shown in part (b). (Points E, G, and H correspond to points A, B, and D, respectively.)

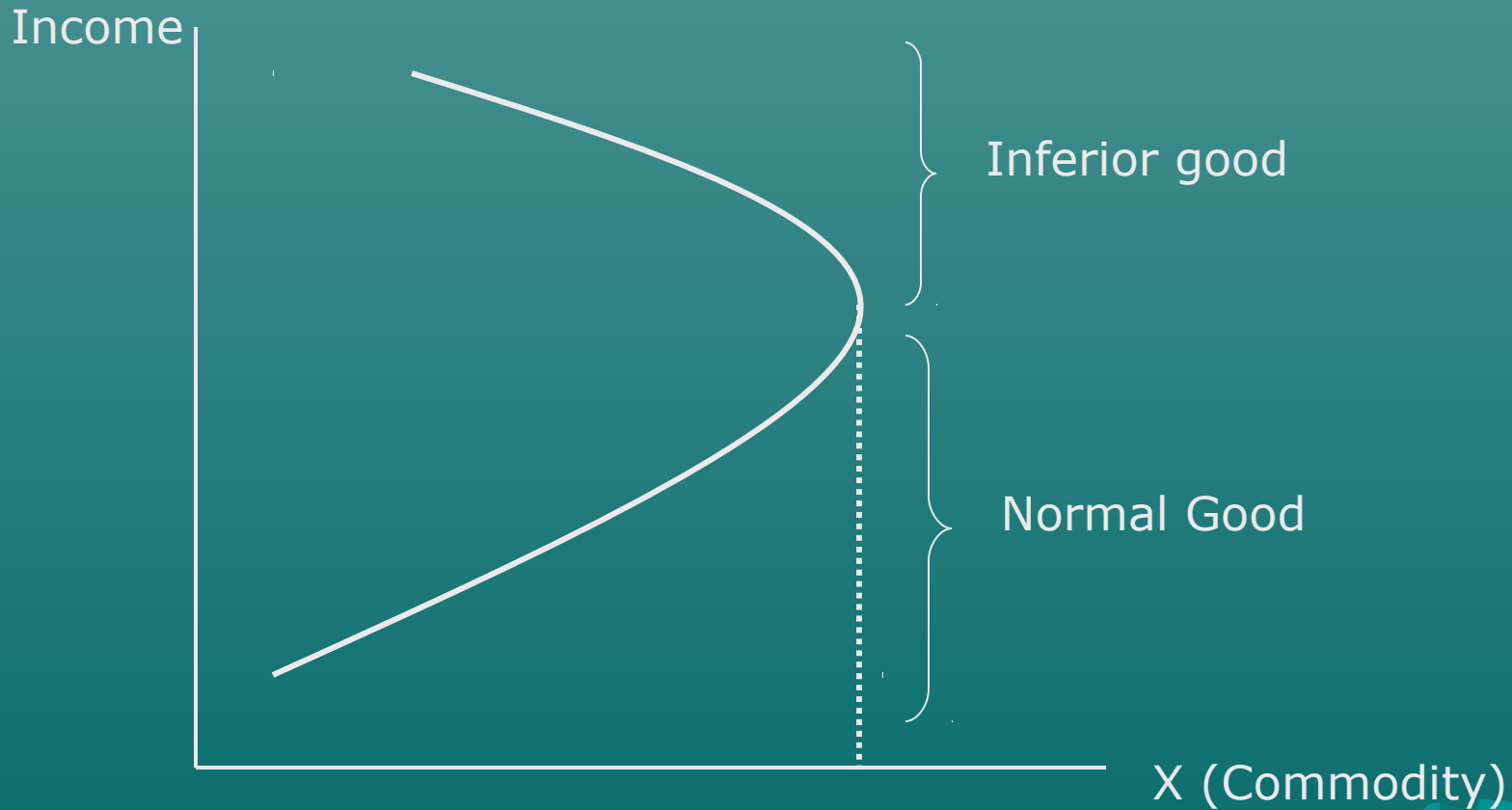
# ICC

Locus of points representing various equilibrium quantities of two commodities consumed at different levels of income, prices remaining constant

ICC for an inferior good ....?

# Engel Curve

Relates good consumed to income





# Price Effect

- ◆ Substitution Effect
- ◆ Income Effect

$$PE = SE + IE$$

# Recap

- ◆ Consumer's preference - *Indifference Curve*
- ◆ Budget Constraint - *Budget line*
- ◆ Consumer equilibrium -  $MRS = \text{price ratios}$
- ◆ Corner Solution
- ◆ PCC - derivation of demand curve
- ◆ ICC - normal & inferior goods
- ◆ Engel curve
- ◆ Price effect - substitution and income effects
- ◆ Giffen goods