Theory of Consumer Behaviour

Consumer Behavior

- **Theory of consumer behavior** explains how consumers allocate their income among different goods and services to maximize their well-being.

Consumer behavior is best understood in three distinct steps:

1. Consumer preferences

2. Budget constraints

3. Consumer choices

CONSUMER PREFERENCES

Market Basket or Bundle

- List with specific quantities of one or more goods.

TABLE Alternative Market Baskets		
Market Basket	Units of Food	Units of Clothing
A	20	30
B	10	50
D	40	20
E	30	40
G	10	20
H	10	40

that apply **earth observation data** to the inventory and management of **natural resources** and the **environment**.

To explain the theory of consumer behavior, we will ask whether consumers *prefer* one market basket to another.

CONSUMER PREFERENCES
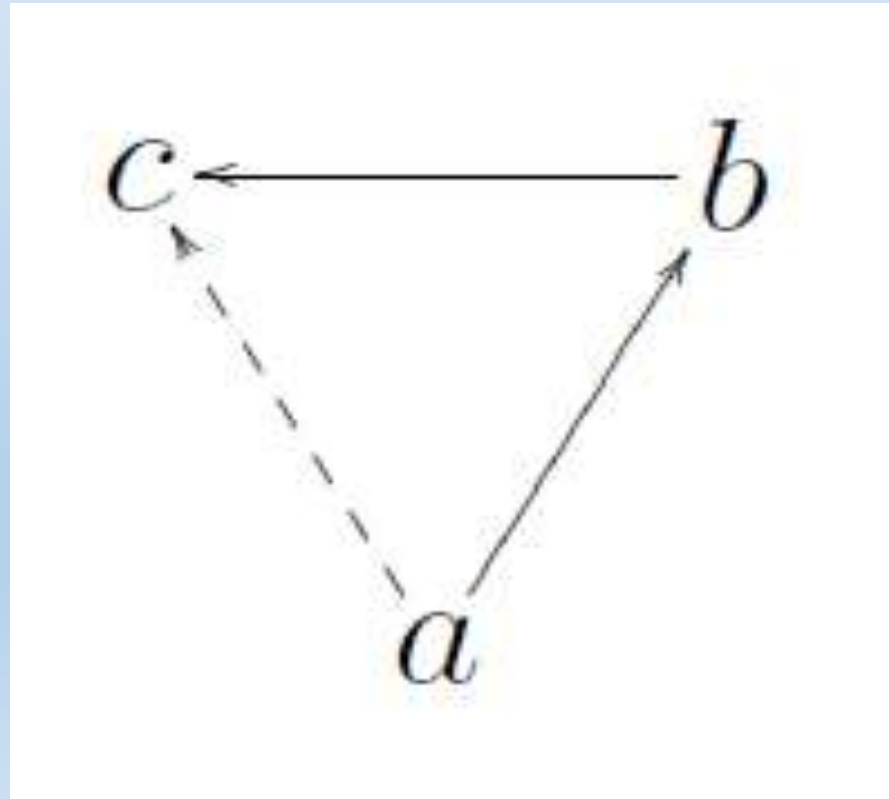
Some Basic Assumptions about Preferences

1. **Completeness:** Preferences are assumed to be *complete*. In other words, consumers can compare and rank all possible baskets. Thus, for any two market baskets *A* and *B*, a consumer will prefer *A* to *B*, will prefer *B* to *A*, or will be indifferent between the two.

   Note that these preferences ignore costs. A consumer might prefer steak to hamburger but buy hamburger because it is cheaper.

2. **Transitivity:** Preferences are *transitive*. Transitivity means that if a consumer prefers basket *A* to basket *B* and basket *B* to basket *C*, then the consumer also prefers *A* to *C*. Transitivity is normally regarded as necessary for consumer consistency.

3. **More is better than less (Non-satiety):** Goods are assumed to be desirable— i.e., to be *good*. Consequently, *consumers always prefer more of any good to less.* In addition, consumers are never satisfied or satiated; *more is always better, even if just a little better*.

Utility

- The value a consumer places on a unit of a good or service depends on the pleasure or satisfaction he or she expects to derive from having or consuming it at the point of making a consumption (consumer) choice.

- In economics the satisfaction or pleasure consumers derive from the consumption of consumer goods is called "utility". It is the "want satisfying power" of the commodity.

Utility

- Consumers, however, cannot have everything they wish to have. Consumers' choices are constrained by their incomes.

- Within the limits of their incomes, consumers make their consumption choices by evaluating and comparing the available consumer goods with regard to their "utilities."

How to Measure Utility

Measuring utility in "utils" (Cardinal):
- Jack derives 10 utils from having one slice of pizza
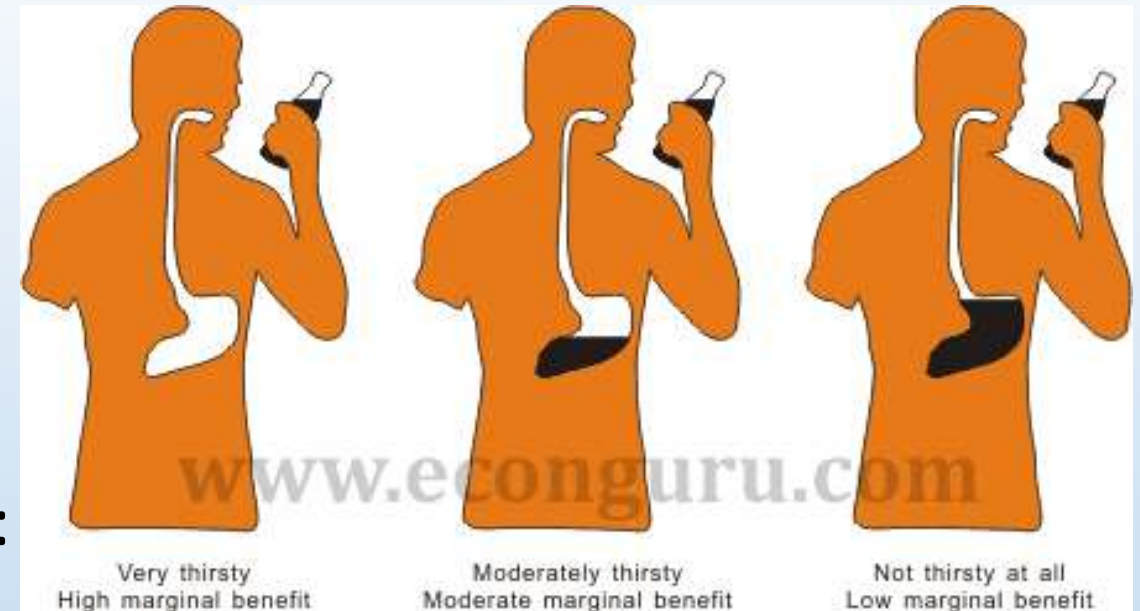- but only 5 utils from having a burger.

Measuring utility by comparison (Ordinal):

- Joy prefers a burger to a slice of pizza and a slice of pizza to a hotdog.

Often consumers are able to be more precise in expressing their preferences.

For example, we could say:

- Joy is willing to trade a burger for four hotdogs but he will give up only two hotdogs for a slice of pizza.

- We can infer that to Joy, a burger has twice as much utility as a slice of pizza, and a slice of pizza has twice as much utility as a hotdog.

www.econguru.com

Very thirsty
High marginal benefit

Moderately thirsty
Moderate marginal benefit

Not thirsty at all
Low marginal benefit

Utility and Money

- Because we use money (rather than hotdogs!) in just about all of our trade transactions, we might as well use it as our comparative measure of utility.

  (Note: This way of measuring utility is not much different from measuring utility in utils)

- Joy could say: I am willing to pay $4 for a burger, $2 for a slice of pizza and $1 for a hotdog.

  Note: Even though Joy obviously values a burger more (four times as much) than a hot dog, he may still choose to buy a hotdog, even if he has enough money to buy a burger, or a slice of pizza, for that matter.

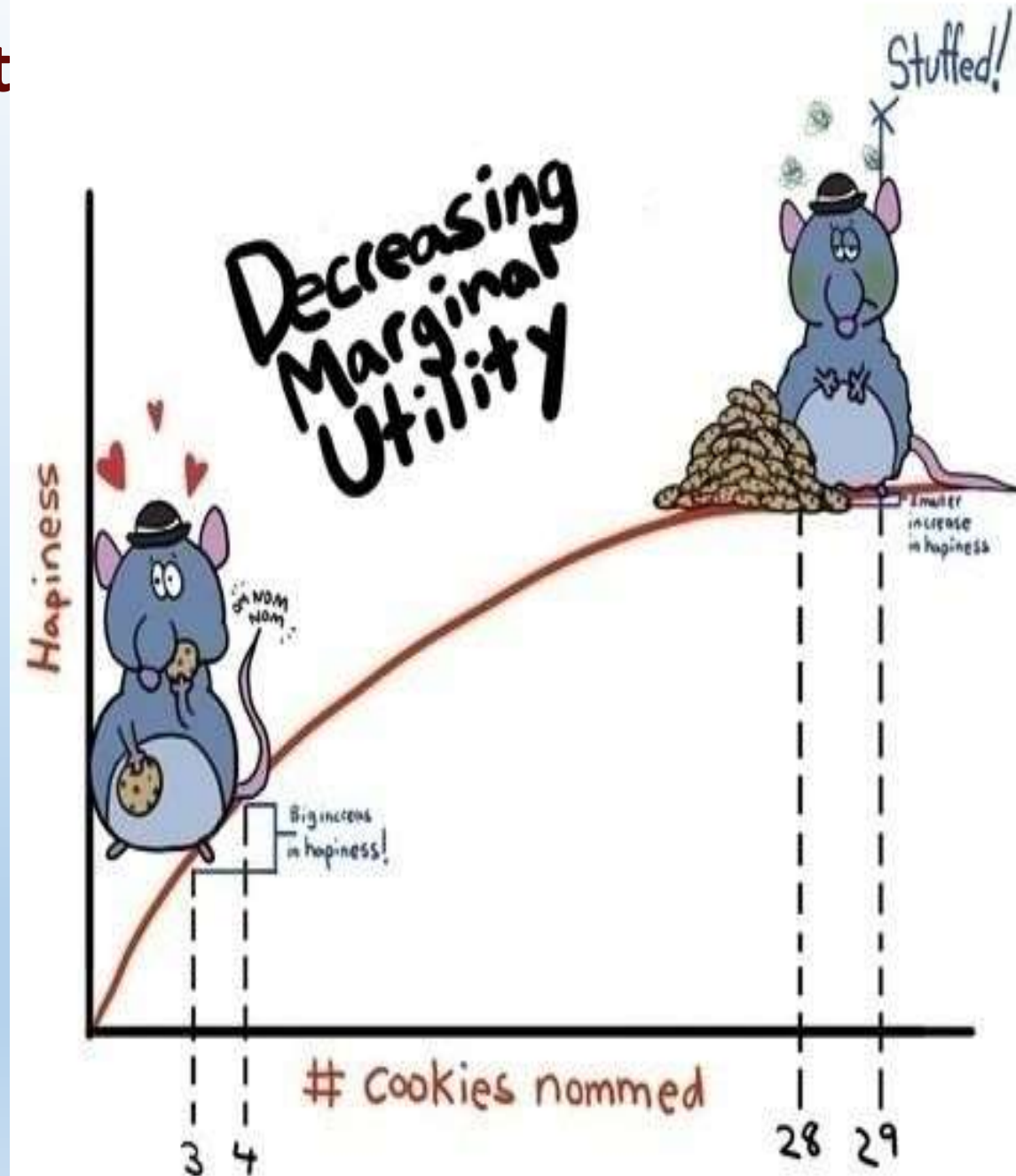# Total Utility Vs Marginal Utility

- Marginal utility is the utility a consumer derives from the last unit of a consumer good she or he consumes (during a given consumption period), ceteris paribus.

Burger 1 Eating the first burger gives the consumer a lot of *satisfaction* (utility)

Burger 2 Eating a second burger will not give as much *extra satisfaction* as the first did (marginal utility)

Burger 3 Eating a third burger will give even *less extra satisfaction* then eating the second one (diminishing marginal utility)

Satisfaction thermometer

- Total utility is the total utility a consumer derives from the consumption of all of the units of a good or a combination of goods over a given consumption period, ceteris paribus.

    Total utility = Sum of marginal utilities

The Law of Diminishing Marginal Utility

- Over a given consumption period, the more of a good a consumer has, or has consumed, the less marginal utility an additional unit contributes to his or her overall satisfaction (total utility).

- Alternatively, we could say: over a given consumption period, as more and more of a good is consumed by a consumer, beyond a certain point, the marginal utility of additional units begins to fall.
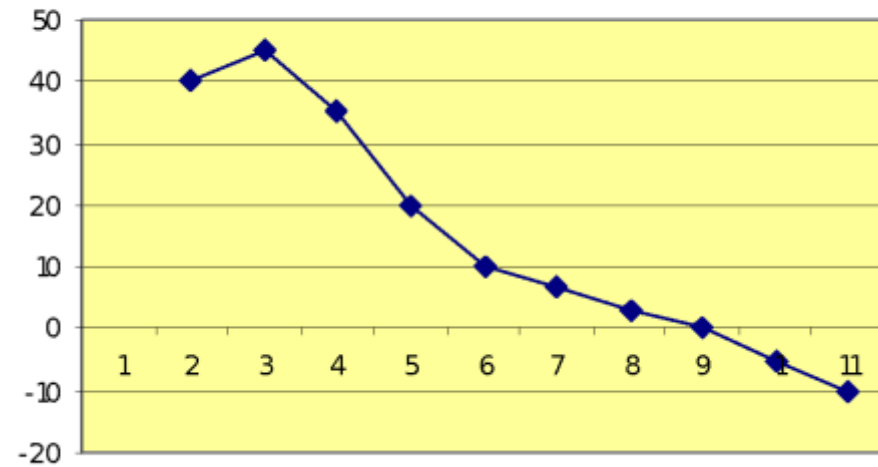
Total and Marginal Utility for Ice Cream

Q	($) TU	($) MU
0	0	
1	40	40
2	85	45
3	120	35
4	140	20
5	150	10
6	157	7
7	160	3
8	160	0
9	155	-5
10	145	-10
		145

Total Utility
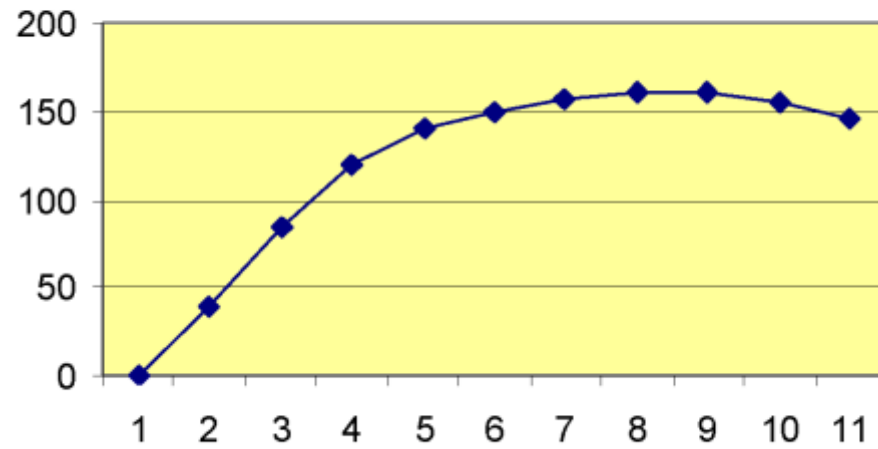
($) MU

Q	($) TU	($) MU
0	0	
1	40	40
2	85	45
3	120	35
4	140	20
5	150	10
6	157	7
7	160	3
8	160	0
9	155	-5
10	145	-10
		145

Hamburger or Hotdog

- If based on their perceived marginal utilities Joy values a hamburger four times as much as a hotdog, but the market price of a burger is four times the price of a hotdog, he will buy a hotdog. That is because one dollar's worth of hotdogs would give her more utility that one dollar's worth of burgers. That is:

$$MU_H/P_H > MU_B/P_B$$

Utility Maximizing Rules

- A rational consumer would buy an additional unit of a good as long as the perceived dollar value of the utility of one additional unit of that good (say, its marginal dollar utility) is greater than its market price.

- The Two-Good Rule

$$\frac{MU_I}{\$P_I} = \frac{MU_H}{\$P_H}$$

Utility Maximization under An Income constraint

☐Consumers' spending on consumer goods is constrained by their incomes:

Income = Px Qx + Py Qy + Pw Qw + ….+Pz Qz

☐While the consumer tries to equalize MUx/Px , MUy/ Py, MUw/Pw,………. and MUz/Pz , to maximize her utility her total spending cannot exceed her income.

For example, with an and income of $86 Joy is trying to decide how much ice cream and how much hamburger he should buy.

Joy's income = 5x10 + 6 x 6 = 86

Optimal Purchase Mix: Ice Cream and Hamburger

Q	MUI	PI	MUI/PI	MUH	PH	MUH/PH
1	40	10	4	45	6	7.5
2	45	10	4.5	30	6	5
3	35	10	3.5	20	6	3.3
4	20	10	2	15	6	2.5
5	10	10	1	10	6	1.7
6	7	10	0.7	6	6	1
7	3	10	0.3	3	6	0.5
8	0	10	0	0	6	0

An Optimal Change

Recall that to maximize utility a consumer would set:

$$(MU_x/P_x) = (MU_y/P_y)$$

If P_x increases this equality would be disturbed: $(MU_x/P_x) < (MU_y/P_y)$

To return to equality the consumer must adjust his/her consumption. (Have in mind that the consumer cannot change prices, and he/she has an income constraint.)

What are the consumer's options?

(MUx/Px) < (MUy/Py)

In order to make the two sides of the above inequality equal again, given that Px and Py could not be changed, we would have to increase MUx and decrease MUy. Recalling the law of diminishing marginal utility, we can increase MUx by reducing X and decrease MUy by increasing Y.

Consumer Equilibrium

Now that we understand the concepts of utility theory - we will use them to explain how consumers make decisions about what to buy

Consumer Equilibrium

- For instance, I would much rather have a Jaguar instead of my Honda
- If I want to maximize my utility, why don't I buy a Jaguar?
  - Because it costs a lot more than the Honda
- So if I want to maximize my utility, I don't just pick the thing that gives me the most pleasure. I have to weigh the price of the good in my decision as well

Consumer Equilibrium

In order to do that I will need to convert utility to utility per dollar. This way, I can see that even though the Jag gives me more utility, I get more utility per dollar from the Honda. So if I want to spend my money wisely, I buy the thing that gives me more **utility per dollar.**

Consumer Equilibrium

- Let's say I walk down to the cafeteria for lunch and they have Pizza and Ice Cream.
- The pizza is $1 a slice and the Ice Cream is $2 a scoop. I have $7 in my pocket What do I buy?

Consumer Equilibrium

- Remember, I want to choose the combination of pizza and Ice Cream that gives me the greatest possible utility for my $7
- Consider the following table, which states the total utility I get from all possible quantities of Pizza and Ice Cream

Utility Table

Quantity	Ice Cream Total Util.	Marginal Util.	Pizza Total Util.	Marginal Util.
0	0	--	0	--
1	24		29	
2	44		46	
3	60		56	
4	70		58	
5	72		59	
6	72		59	

Utility Table

Quantity	Ice Cream		Pizza	
	Total Util.	Marginal Util.	Total Util.	Marginal Util.
0	0	--	0	--
1	24	24	29	29
2	44	20	46	17
3	60	16	56	10
4	70	10	58	2
5	72	2	59	1
6	72	0	59	0

Consumer Equilibrium

- We need to find the marginal utility per dollar for both goods.

- Consider the first scoop of ice cream - MU 12 per dollar. MU of the first slice of pizza 29 per dollar. So I want to buy the pizza. Now I have $6.

- Now I have to compare my second slice of pizza (MU is 17 /$) with the first scoop of ice cream (MU is 12 /$). I will want to buy the second slice of pizza. I have $5.

Consumer Equilibrium

- Now I have to compare the third slice o pizza (MU 10/$) with the first scoop of ice cream (MU 12/$). I will want to buy the ice cream. I have $3.

- Now I have to compare the third slice of pizza (MU 10 /$) with the second scoop of ice cream (MU 10 /$). It doesn't matter which I pick, since they make me equally happy. I'll take the pizza. Now I have $2

Consumer Equilibrium

- Now I have to compare the fourth slice of pizza (MU is 2/$) to the second scoop of ice cream (MU is 10 /$). I will want to buy the ice cream. I have no more money.

- I bought 3 slices of pizza which give a total utility of 56 and 2 scoops of ice cream which give a total utility of 44. My total utility from lunch is 56+44=100. There is no other combination of pizza and ice cream that give a greater utility for $7.

Consumer Equilibrium

- What if the price of the ice cream dropped to $1 a scoop.
- Assignment: Convince yourself that I will buy 4 scoops of ice cream and 3 slices of pizza.
- Note that when the price went down, I bought more - THIS IS WHERE THE LAW OF DEMAND COMES FROM.

Consumer Equilibrium

- In summary, you need to convert marginal utility to marginal utility per dollar
- Then compare MU/P for the two goods and buy the one that gives the greatest MU/P
- Subtract the price from your budget
- Compare the next available units of both goods and repeat the process until you are out of money.

Preferences:
What the Consumer Wants

A consumer's preference among consumption bundles may be illustrated with indifference curves.

An **indifference** curve shows bundles of goods that make the consumer equally happy.

The Consumer's Preferences…
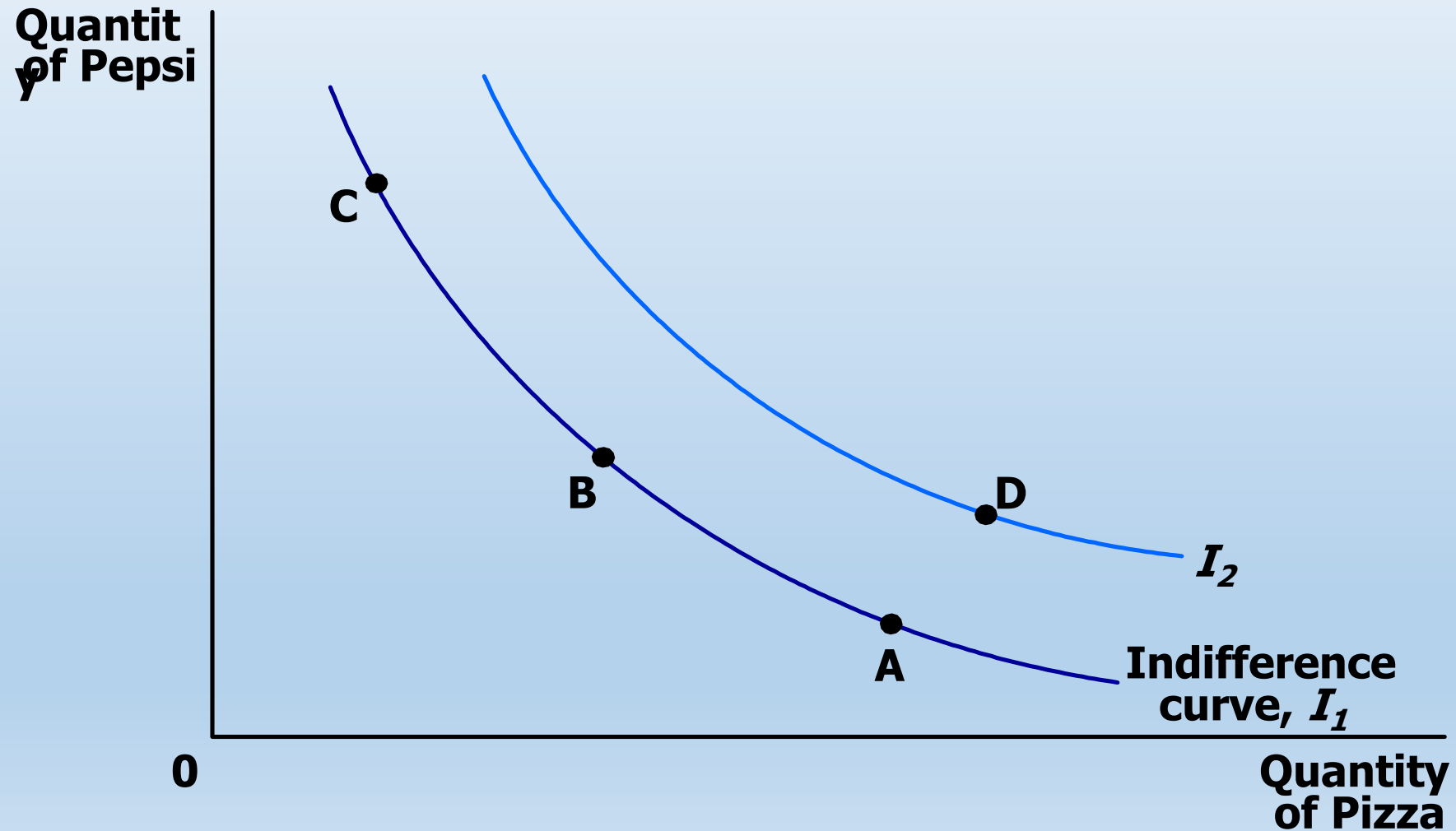
The Consumer's Preferences

- The consumer is indifferent, or equally happy, with the combinations shown at points A, B, and C because they are all on the same curve.

Example: Utility and a single indifference curve

y

Preference direction

20 = xy

10 = xy

5

2

0   2   5   x
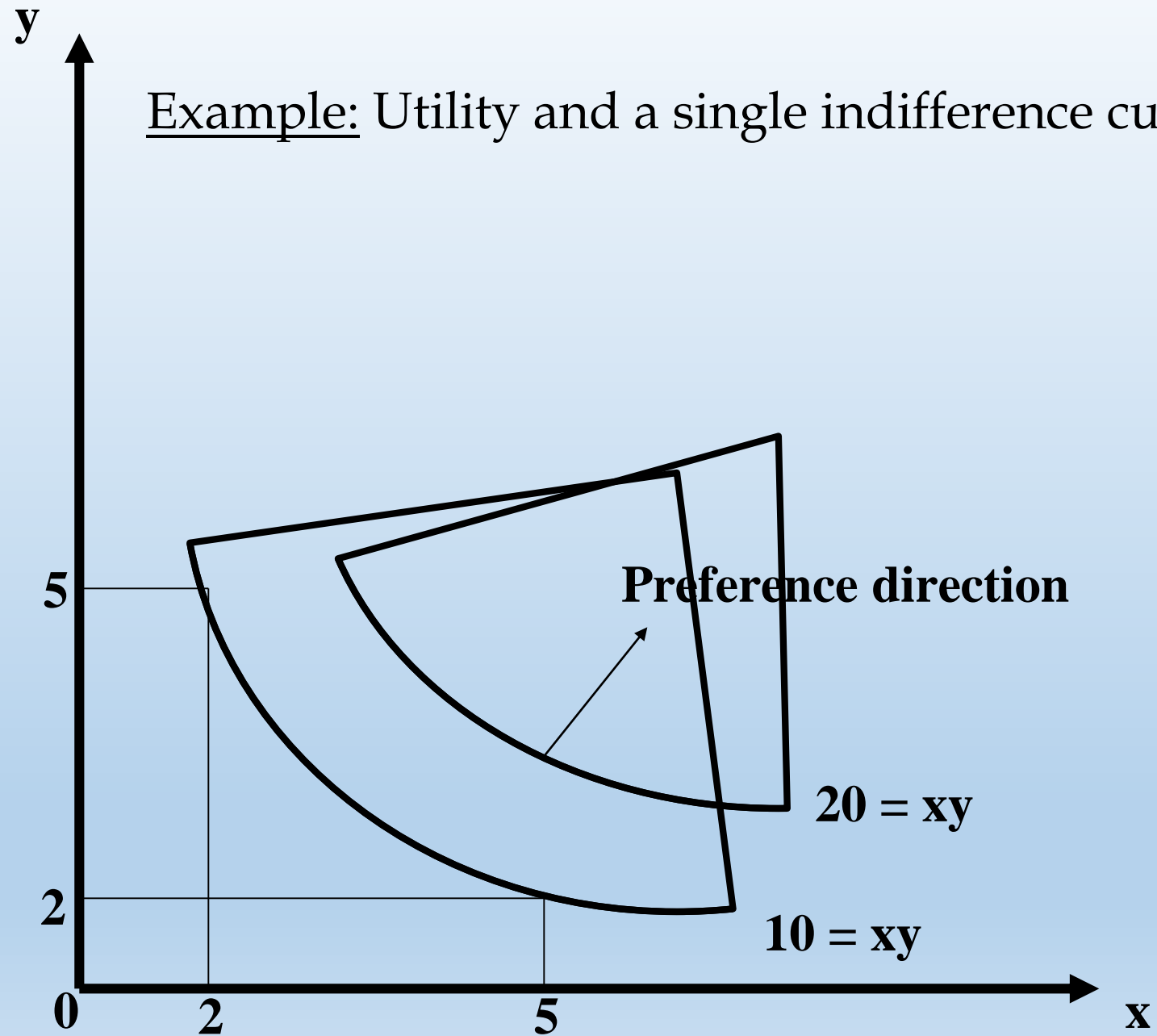
The Marginal Rate of Substitution

- The slope at any point on an indifference curve is the marginal rate of substitution.
  - It is the rate at which a consumer is willing to substitute one good for another.
  - It is the amount of one good that a consumer requires as compensation to give up one unit of the other good.

The Consumer's Preferences...
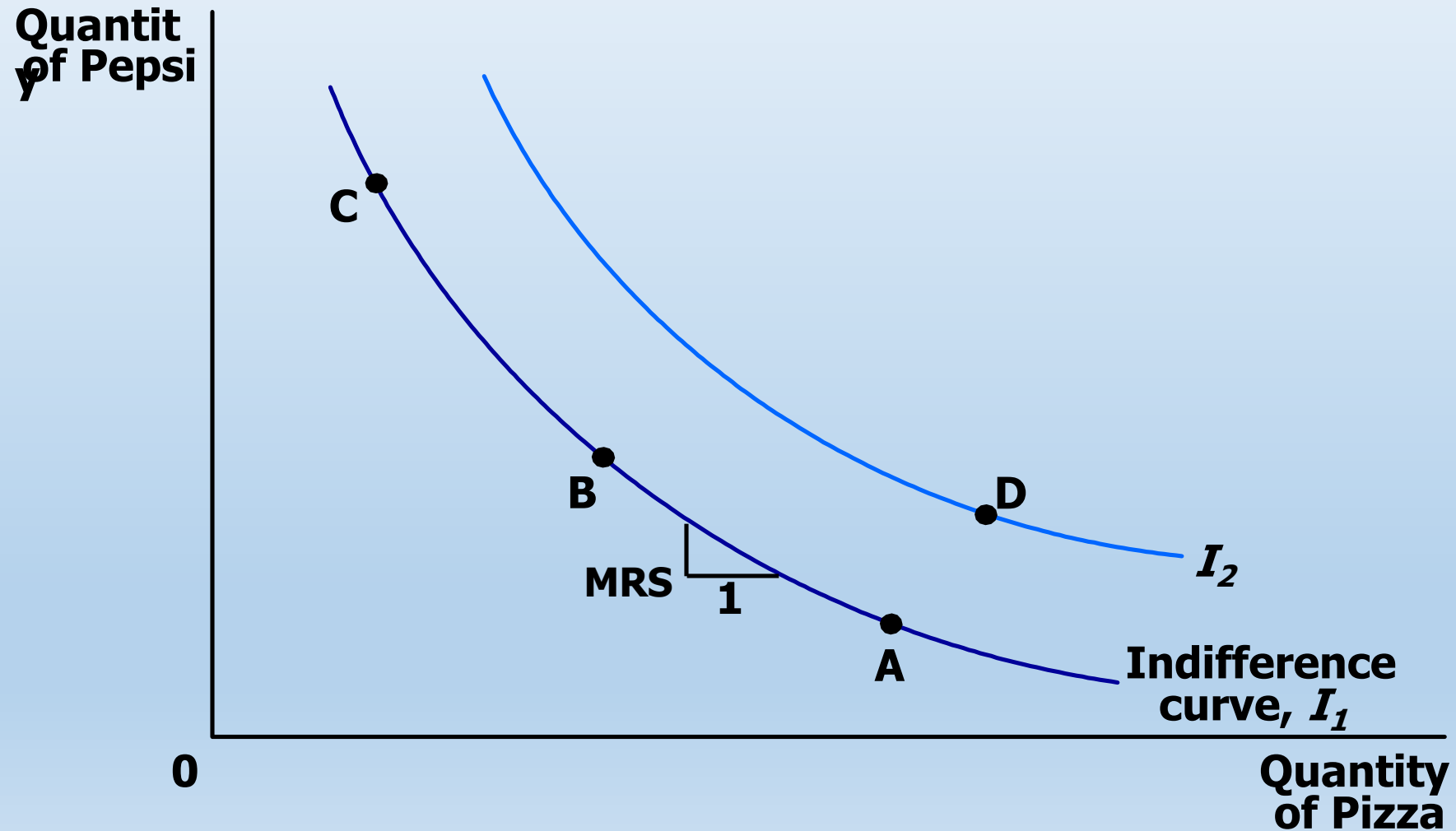
Marginal Utility and the Marginal Rate of Substitution

We can express the MRS for any basket as a ratio of the marginal utilities of the goods in that basket

- Suppose the consumer changes the level of consumption of x and y. Using differentials:

  $$dU = MU_x \cdot dx + MU_y \cdot dy$$

- Along a particular indifference curve, dU = 0, so:

  $$0 = MU_x \cdot dx + MU_y \cdot dy$$

Marginal Utility and the Marginal Rate of Substitution

- Solving for dy/dx:

$$\frac{dy}{dx} = -\frac{MU_x}{MU_y}$$

- By definition, $MRS_{x,y}$ is the negative of the slope of the indifference curve:

$$MRS_{x,y} = \frac{MU_x}{MU_y}$$
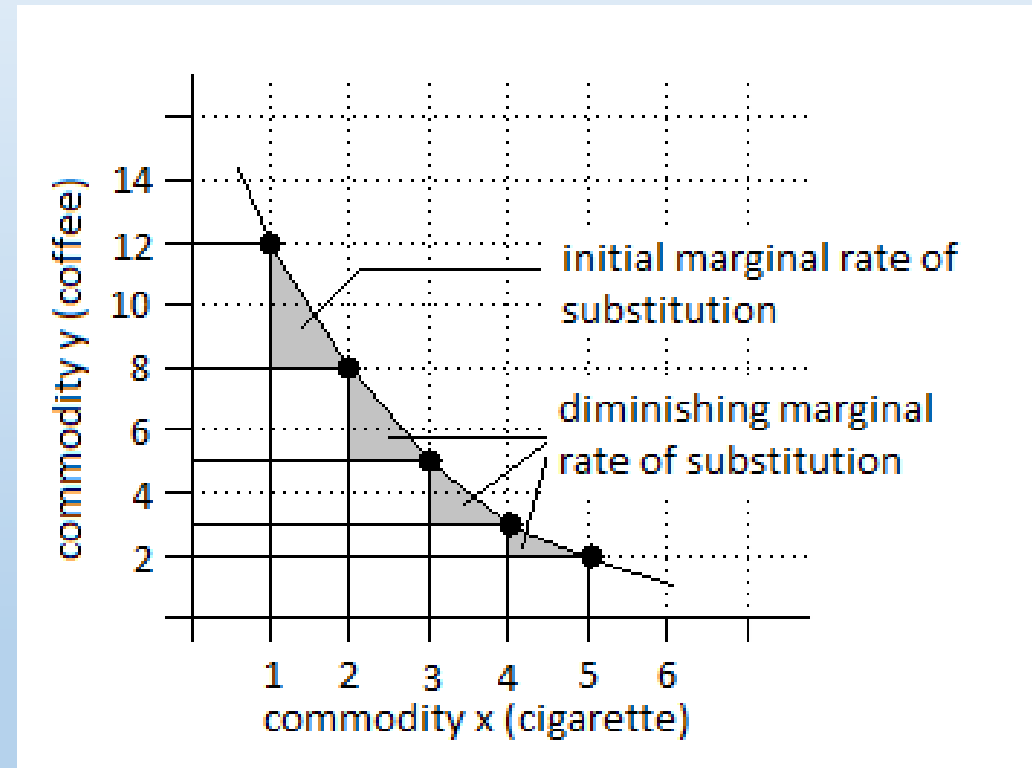
Properties of Indifference Curves

✓Higher indifference curves are preferred to lower ones.

✓Indifference curves are downward sloping.

✓Indifference curves do not cross.

✓Indifference curves are Convex to the Origin.

Property 1: Higher indifference curves are preferred to lower ones.

- Consumers usually prefer more of something to less of it.

- Higher indifference curves represent larger quantities of goods than do lower indifference curves.

Property 2: Indifference curves are downward sloping.

- A consumer is willing to give up one good only if he or she gets more of the other good in order to remain equally happy.

- If the quantity of one good is reduced, the quantity of the other good must increase.

- For this reason, most indifference curves slope downward.

Property 3: Indifference curves do not cross.
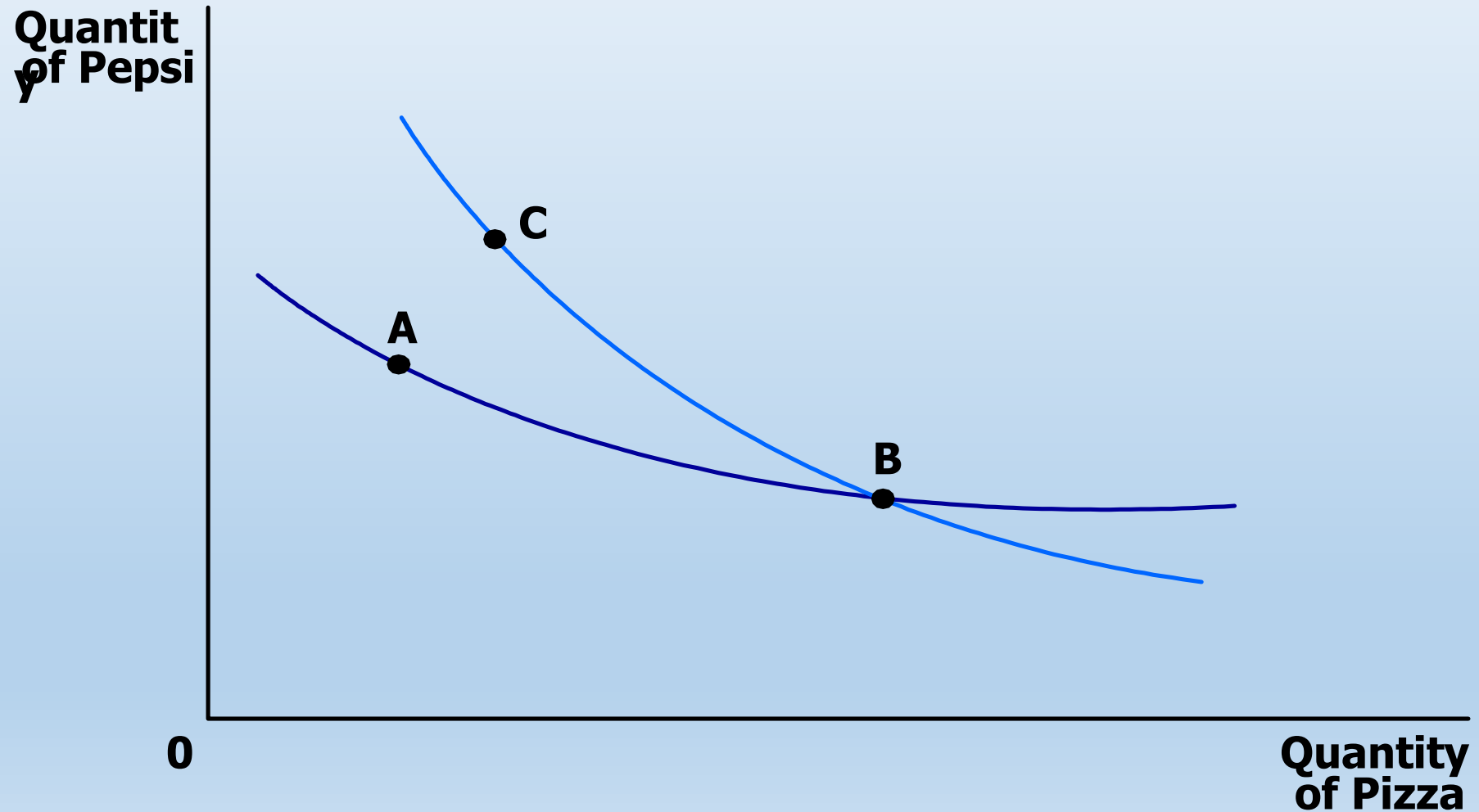
Property 4: Indifference curves are bowed inward.

- **People are more willing to trade away goods that they have in abundance and less willing to trade away goods of which they have little.**
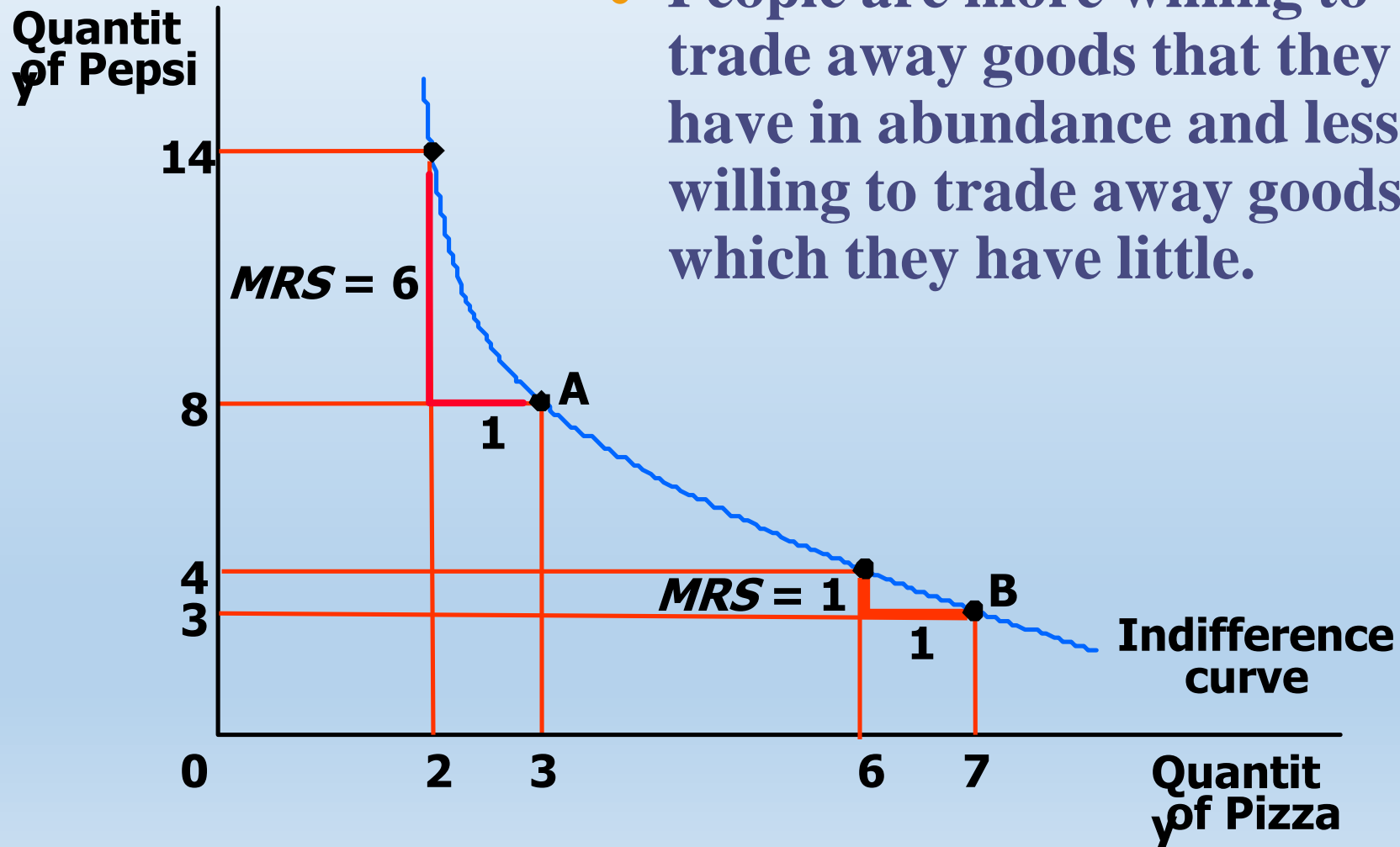
An indifference curve exhibits a **diminishing marginal rate of substitution**:

1. The more of good x you have, the more you are willing to give up to get a little of good y.

1. The indifference curves
   - Get flatter as we move out along the horizontal axis
   - Get steeper as we move up along the vertical axis.

Example: The Diminishing Marginal Rate of Substitution
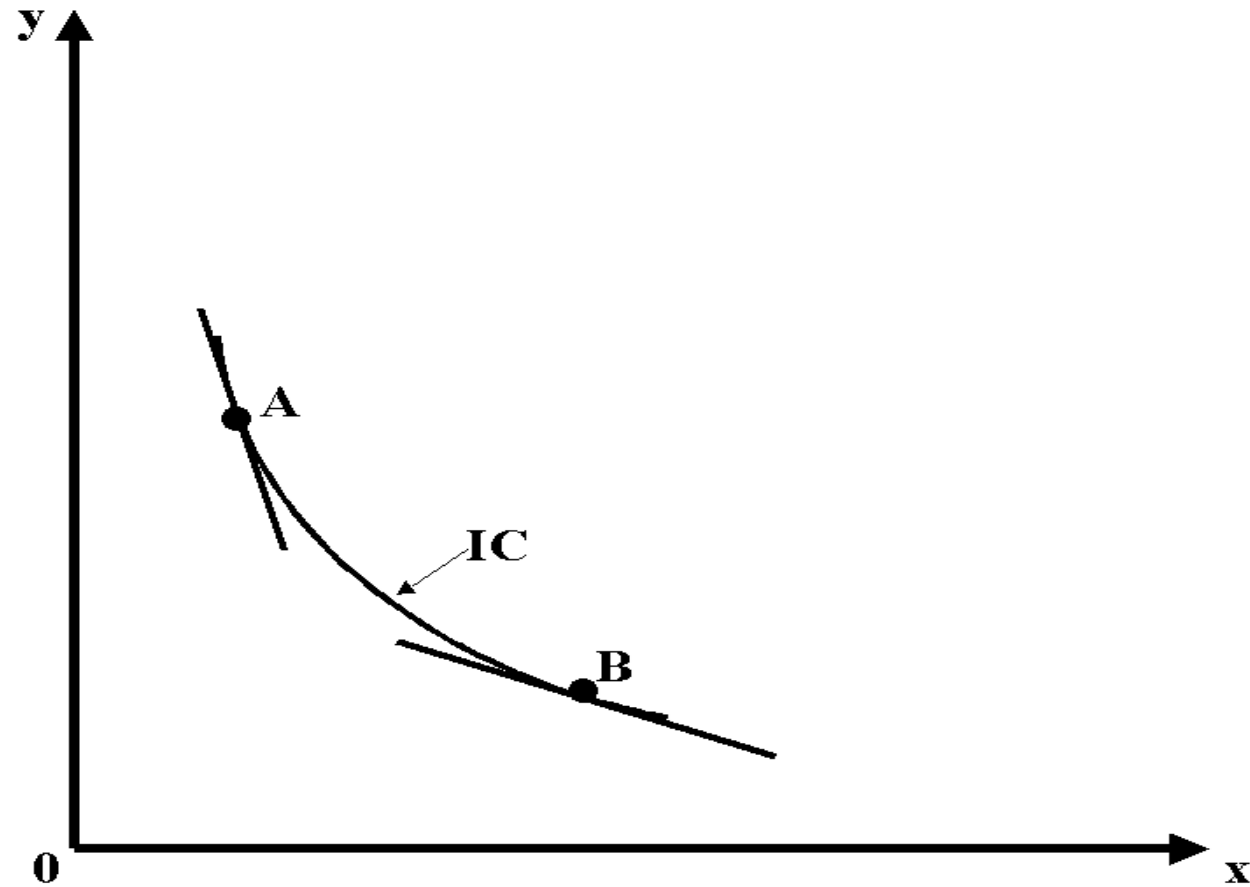
Perfect Substitutes

Pepsi

6

4

2

I_1 I_2 I_3

0   1   2   3   Coke
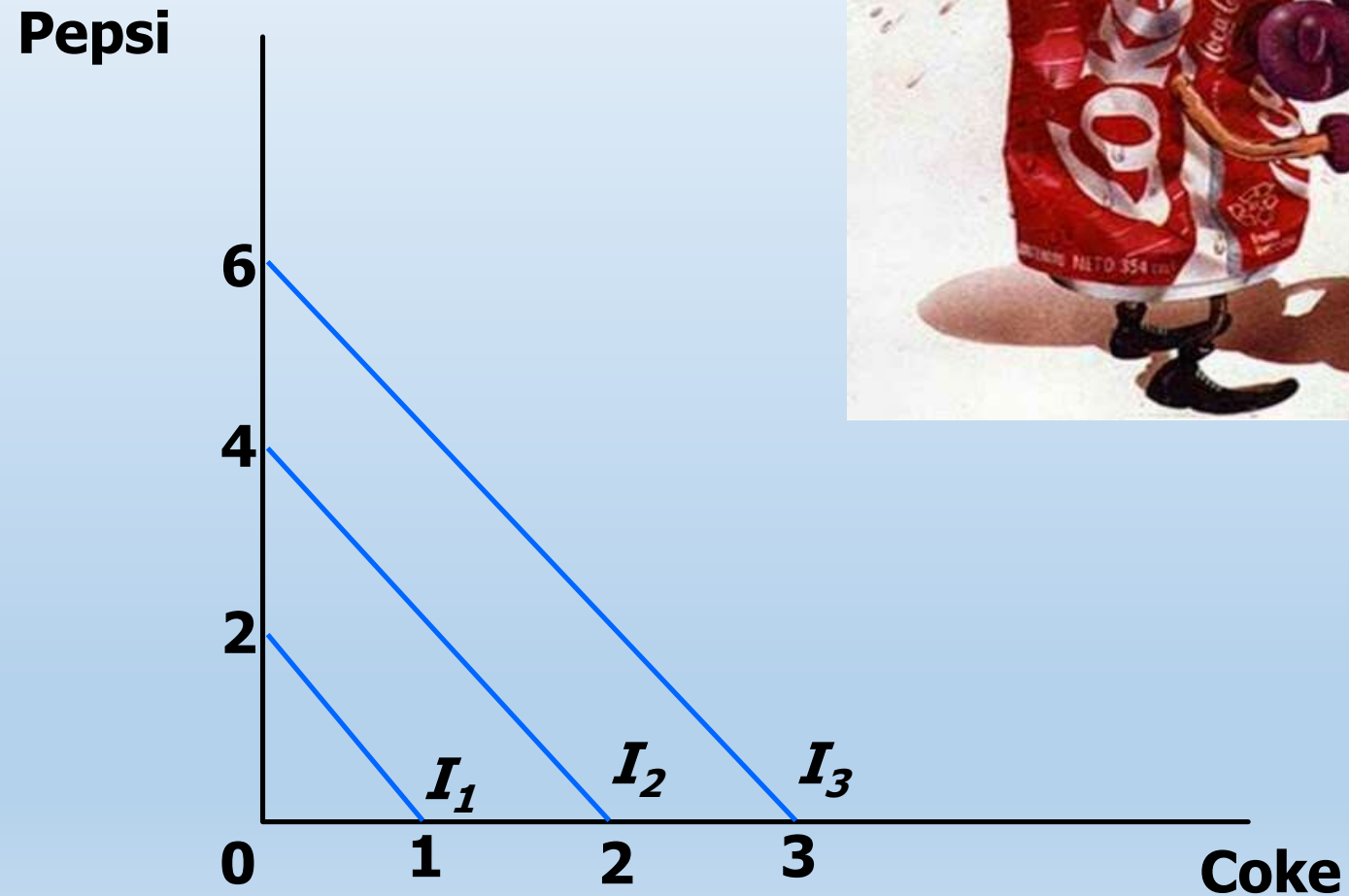
Perfect Complements
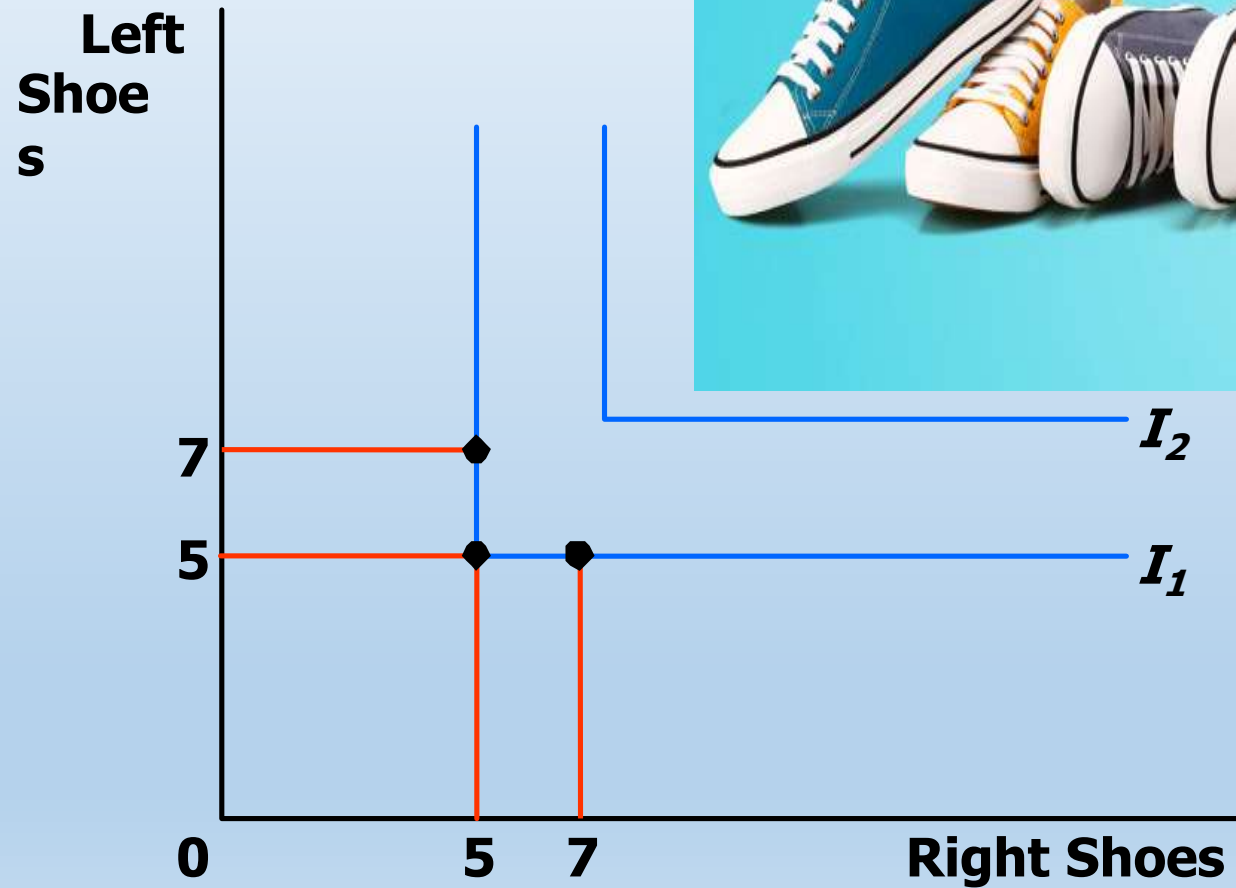
The Budget Line

- The budget line depicts the consumption "bundles" that a consumer can afford.
  - People consume less than they desire because their spending is constrained, or limited, by their income.

The Consumer's Budget Line...
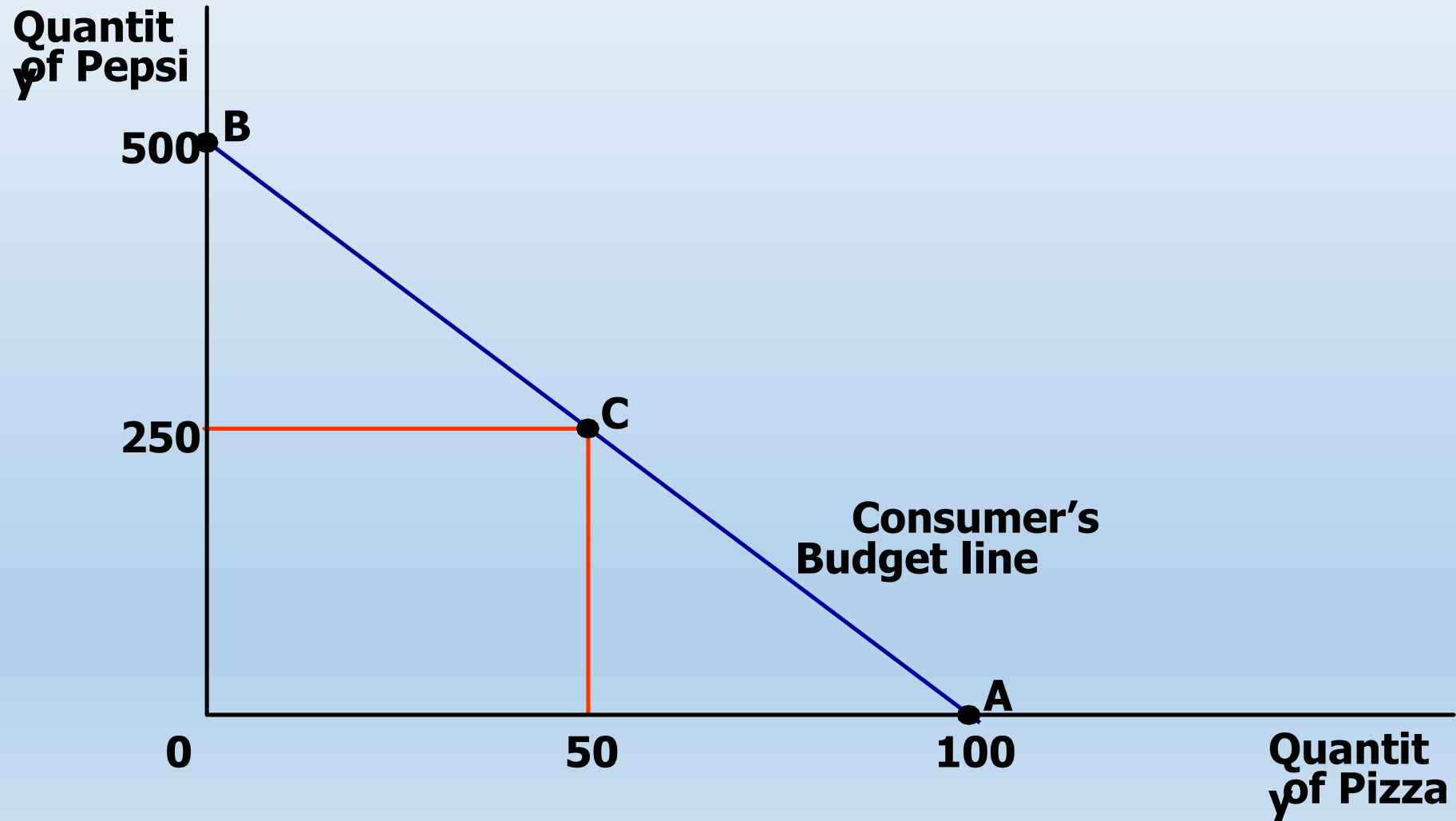
The Consumer's Budget Line

- The <u>slope</u> of the budget line equals the relative price of the two goods, that is, the price of one good compared to the price of the other.
- It measures the rate at which the consumer will trade one good for the other.

Satisfaction is maximized (given the budget constraint) at the point where

$$\text{MRS} = P_F / P_C$$

- **marginal benefit**   Benefit from the consumption of one additional unit of a good.

- **marginal cost**   Cost of one additional unit of a good.

In this instance, satisfaction is maximized when the **marginal benefit**—the benefit associated with the consumption of one additional unit of food—is equal to the **marginal cost**—the cost of the additional unit of food. The marginal benefit is measured by the MRS.

The utility maximizing market basket must satisfy two conditions:

1. *It must be located on the budget line.*
2. *It must give the consumer the most preferred combination of goods and services.*

A consumer maximizes satisfaction by choosing market basket *A*. At this point, the budget line and indifference curve U_2 are tangent.

No higher level of satisfaction (e.g., market basket *D*) can be attained.

At *A*, the point of maximization, the MRS between the two goods equals the price ratio. At *B*, however, because the MRS [−(−10/10) = 1] is greater than the price ratio (1/2), satisfaction is not maximized.

Clothing (units per week)

−10C

+10F

U_3

U_2

U_1
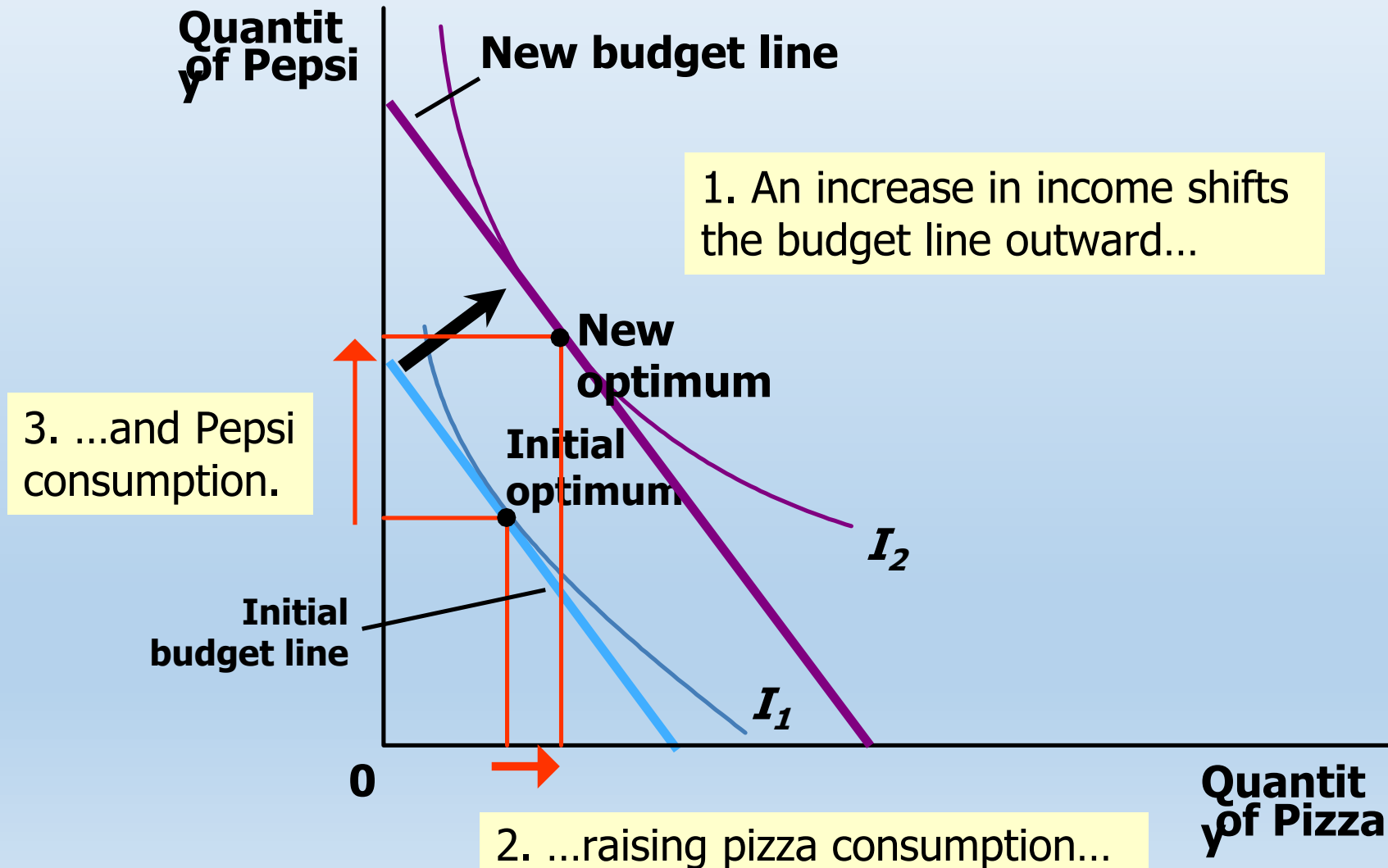
Budget Line

Food (units per week)
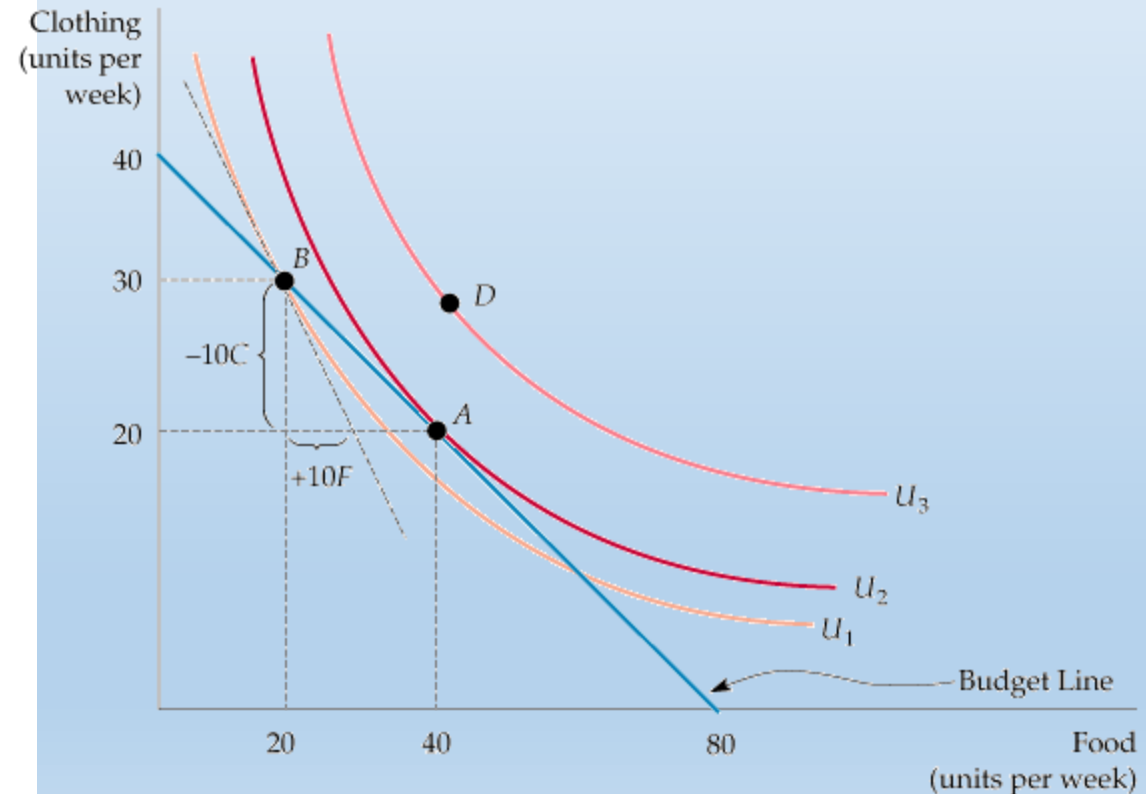
The Consumer's Optimum...
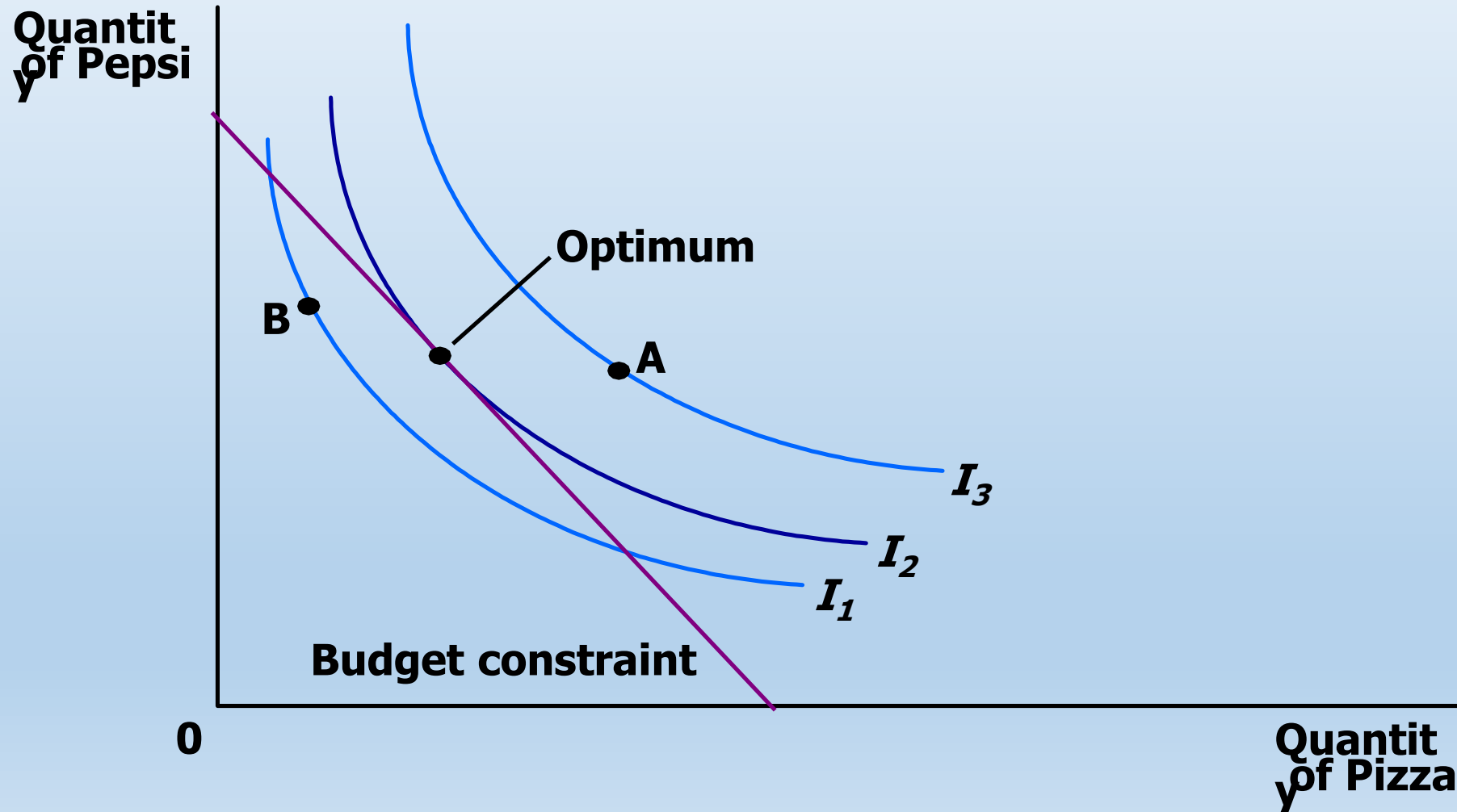
How Changes in Income Affect the Consumer's Choices

- An increase in income shifts the budget line outward.
  - The consumer is able to choose a better   combination of goods on a higher indifference curve.

An Increase in Income…

Quantity of Pepsi

New budget line

1. An increase in income shifts the budget line outward…

New optimum

3. …and Pepsi consumption.

Initial optimum

I_2

Initial budget line

I_1

0

2. …raising pizza consumption…

Quantity of Pizza

How Changes in Prices Affect Consumer Choices

A fall in the price of any good rotates the budget constraint outward and changes the slope of the budget line.
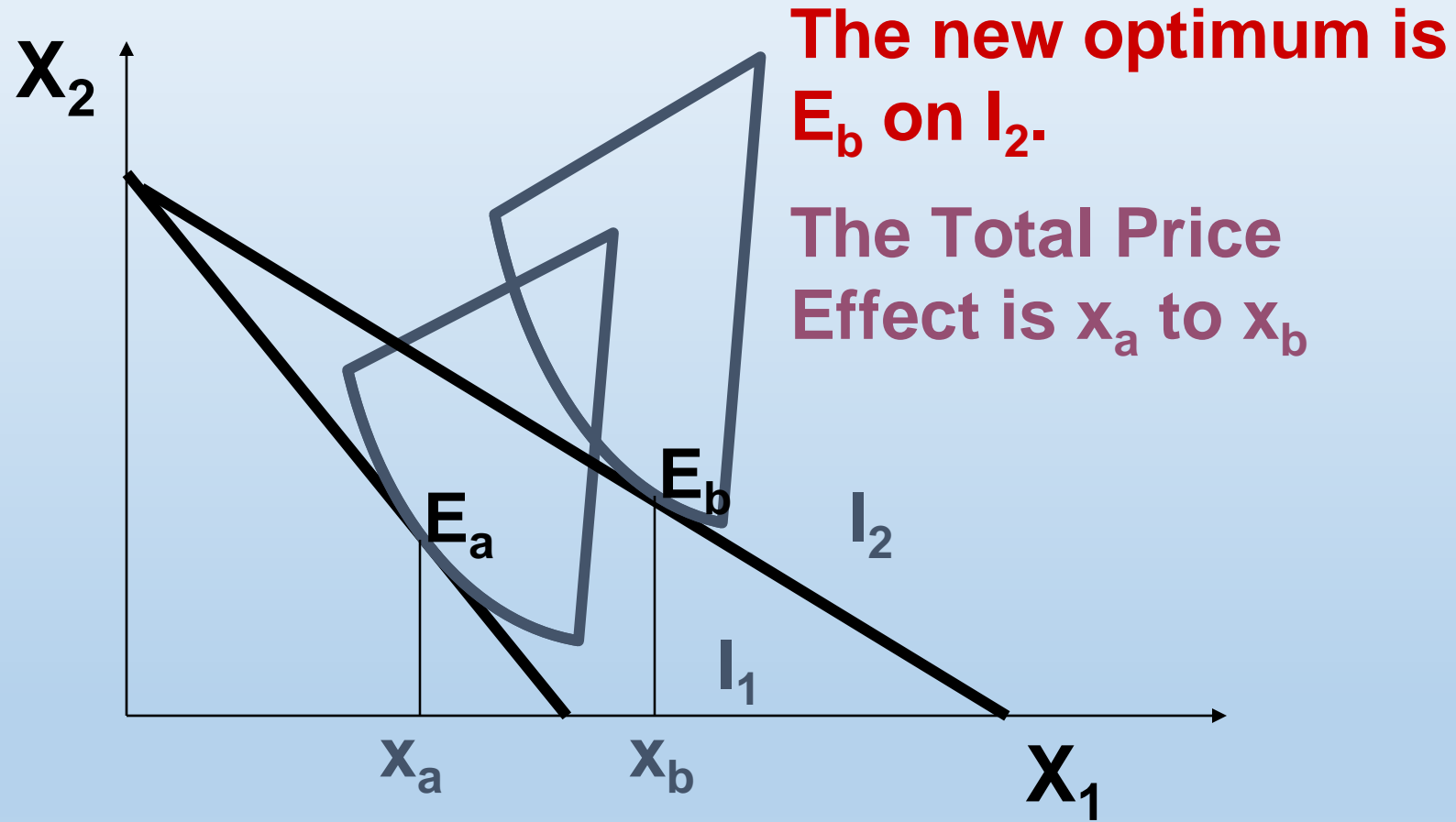
A Change in Price...
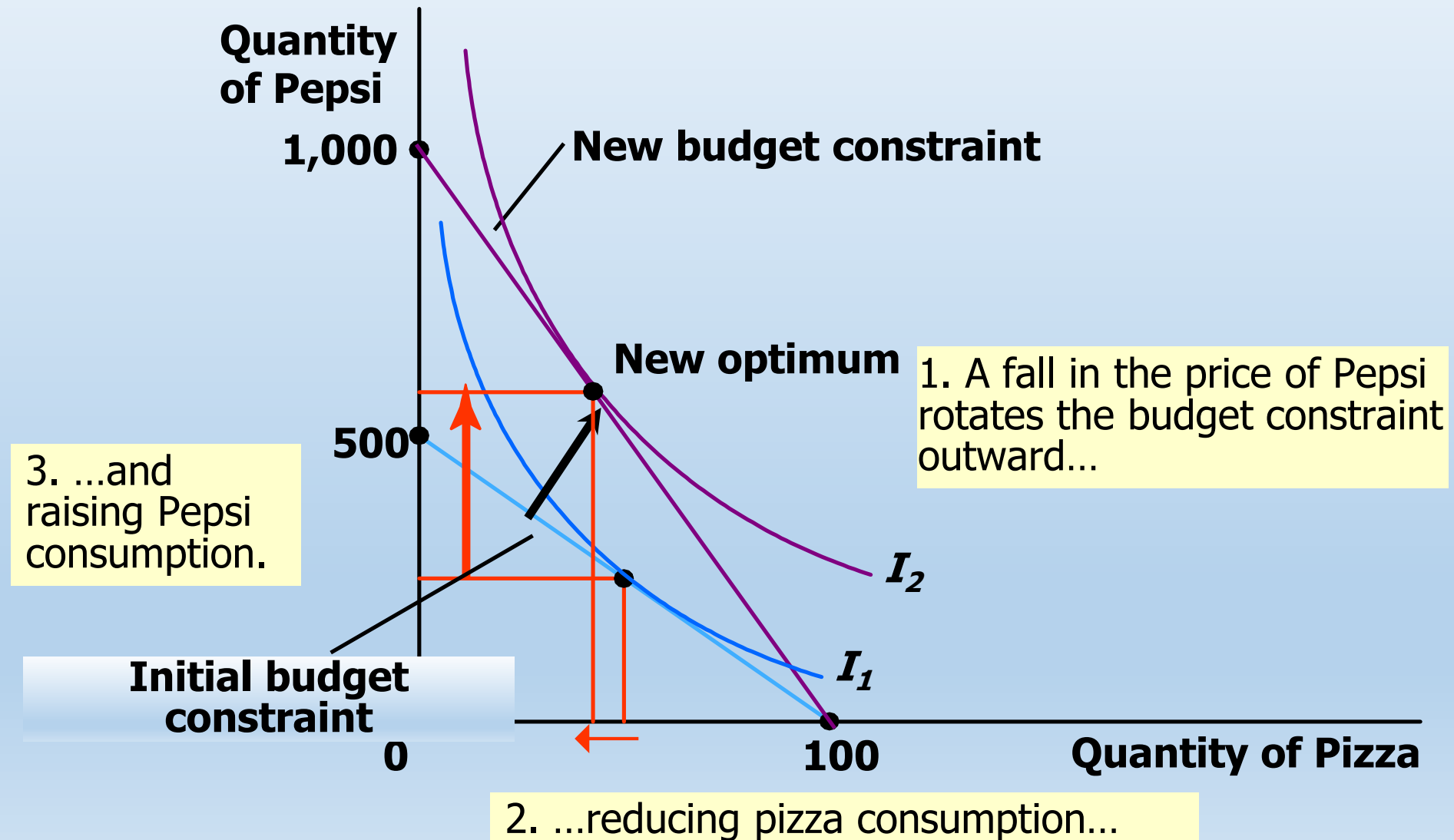
INCOME AND SUBSTITUTION EFFECTS

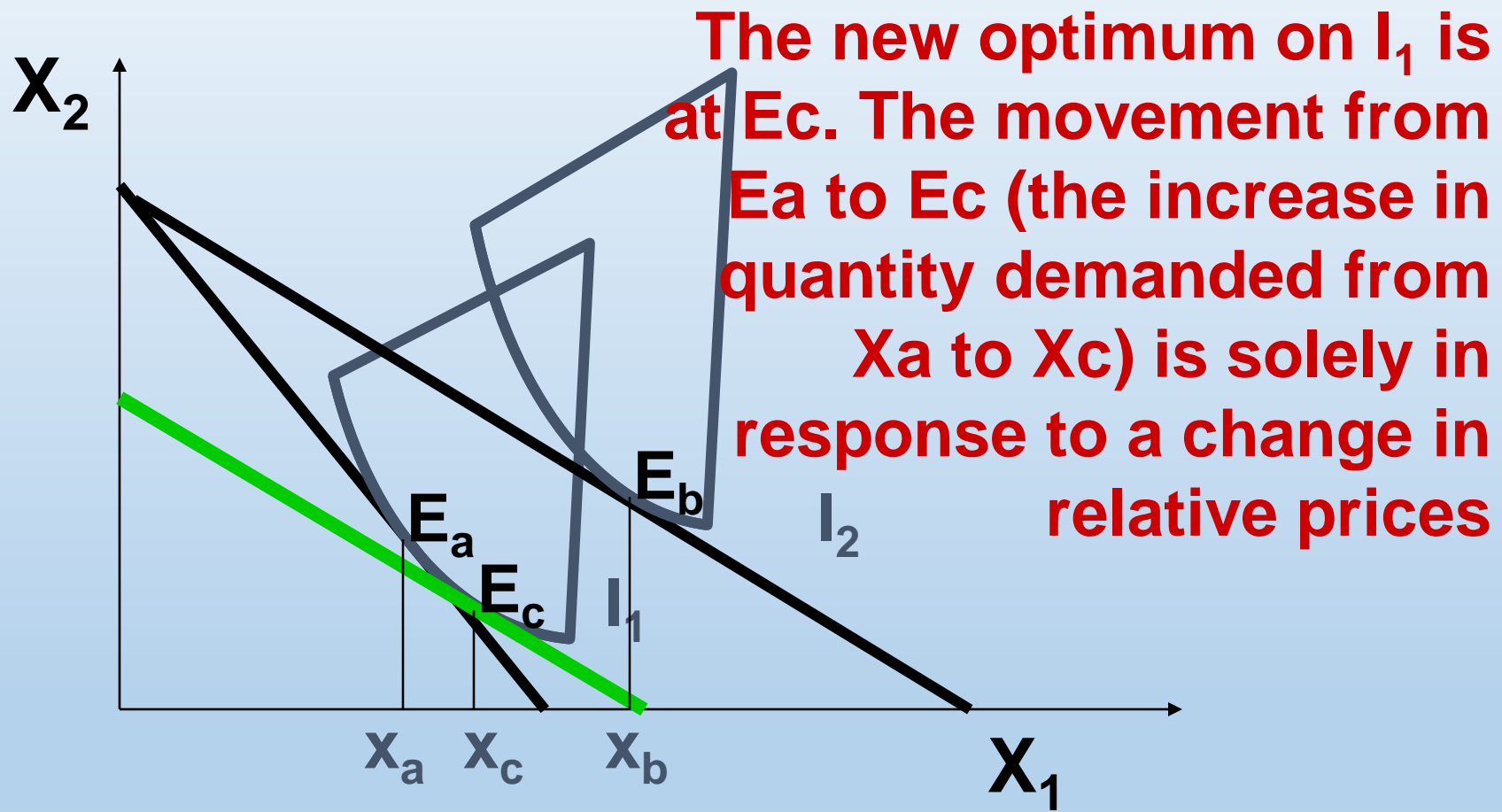A fall in the price of a good has two implications:

1. *Consumers will tend to buy more of the good that has become cheaper and less of those goods that are now relatively more expensive.*

1. *Because one of the goods is now cheaper, consumers enjoy an increase in real purchasing power.*
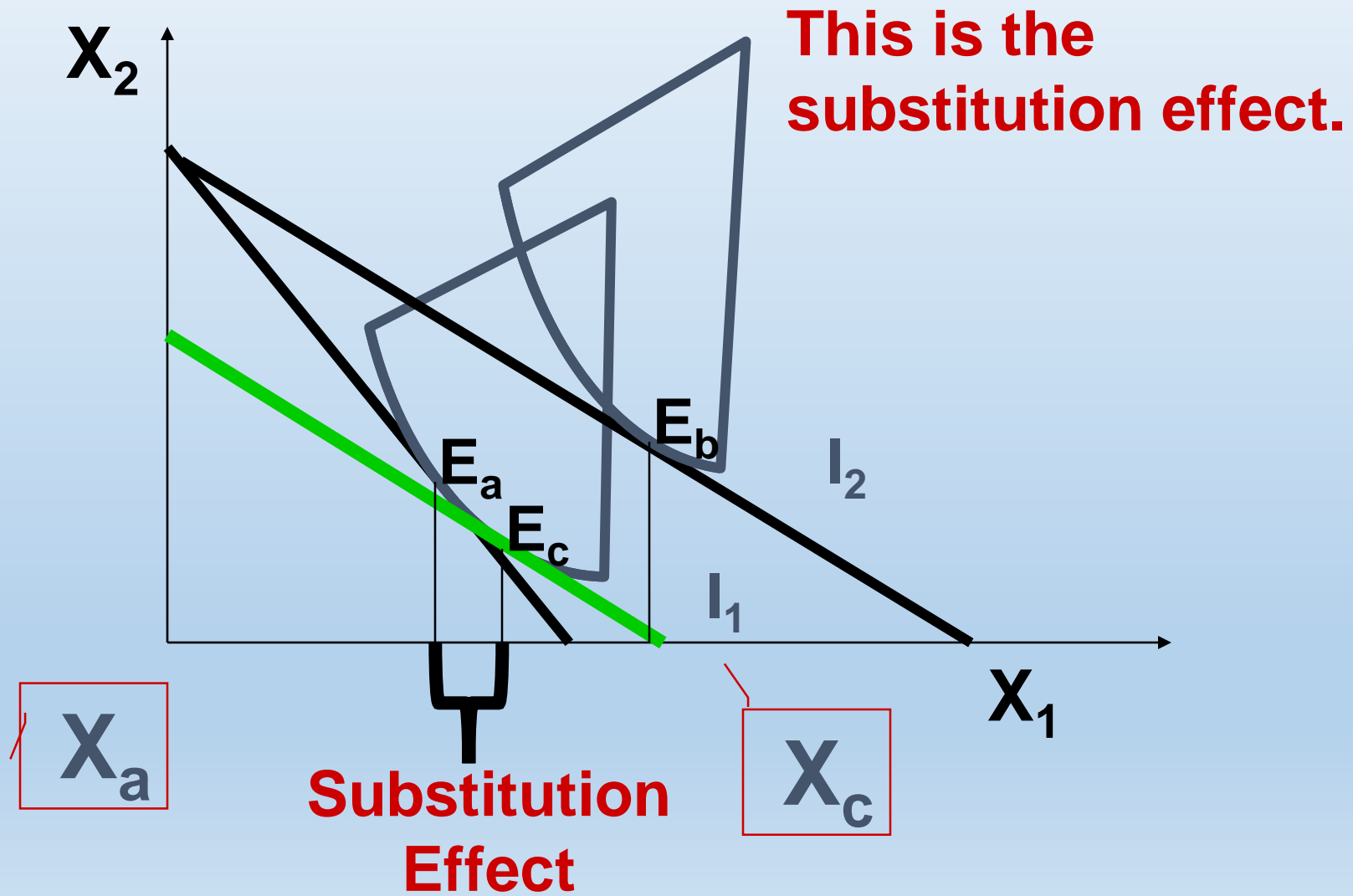
Income and Substitution Effects

- A price change has two effects on consumption.
  - An **income effect**
  - A **substitution effect**

- The **income effect** is the change in consumption that results when a price change moves the consumer to a higher or lower indifference curve.

- The **substitution effect** is the change in consumption that results when a price change moves the consumer along an indifference curve to a point with a different marginal rate of substitution.

The new optimum is E_b on I_2.

The Total Price Effect is x_a to x_b

The new optimum on I_1 is at Ec. The movement from Ea to Ec (the increase in quantity demanded from Xa to Xc) is solely in response to a change in relative prices
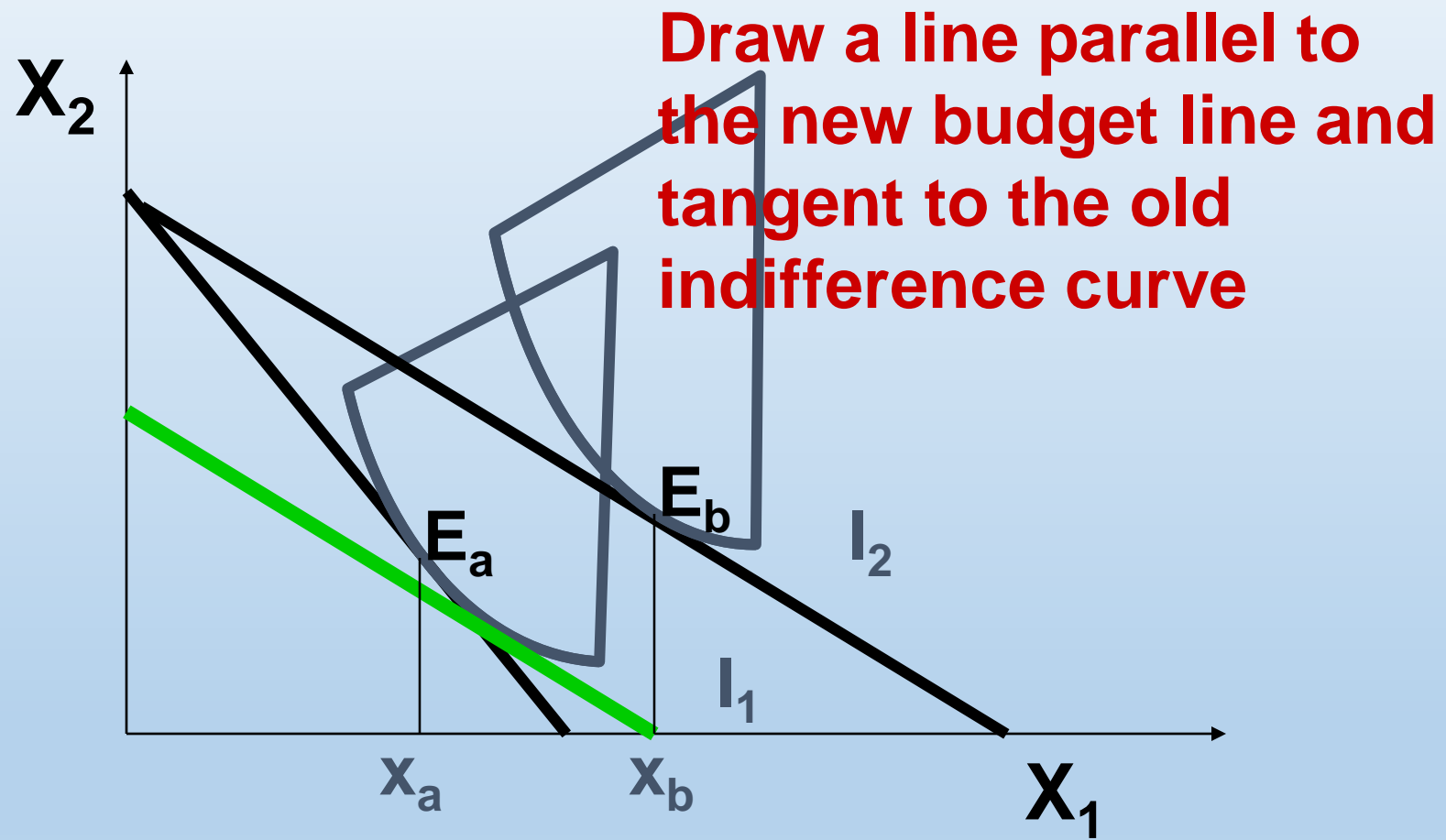
The new optimum on I₁ is at Ec. The movement from Ec to Eb (the increase in quantity demanded from Xc to Xb) is solely in response to income Change

This is the Income effect.
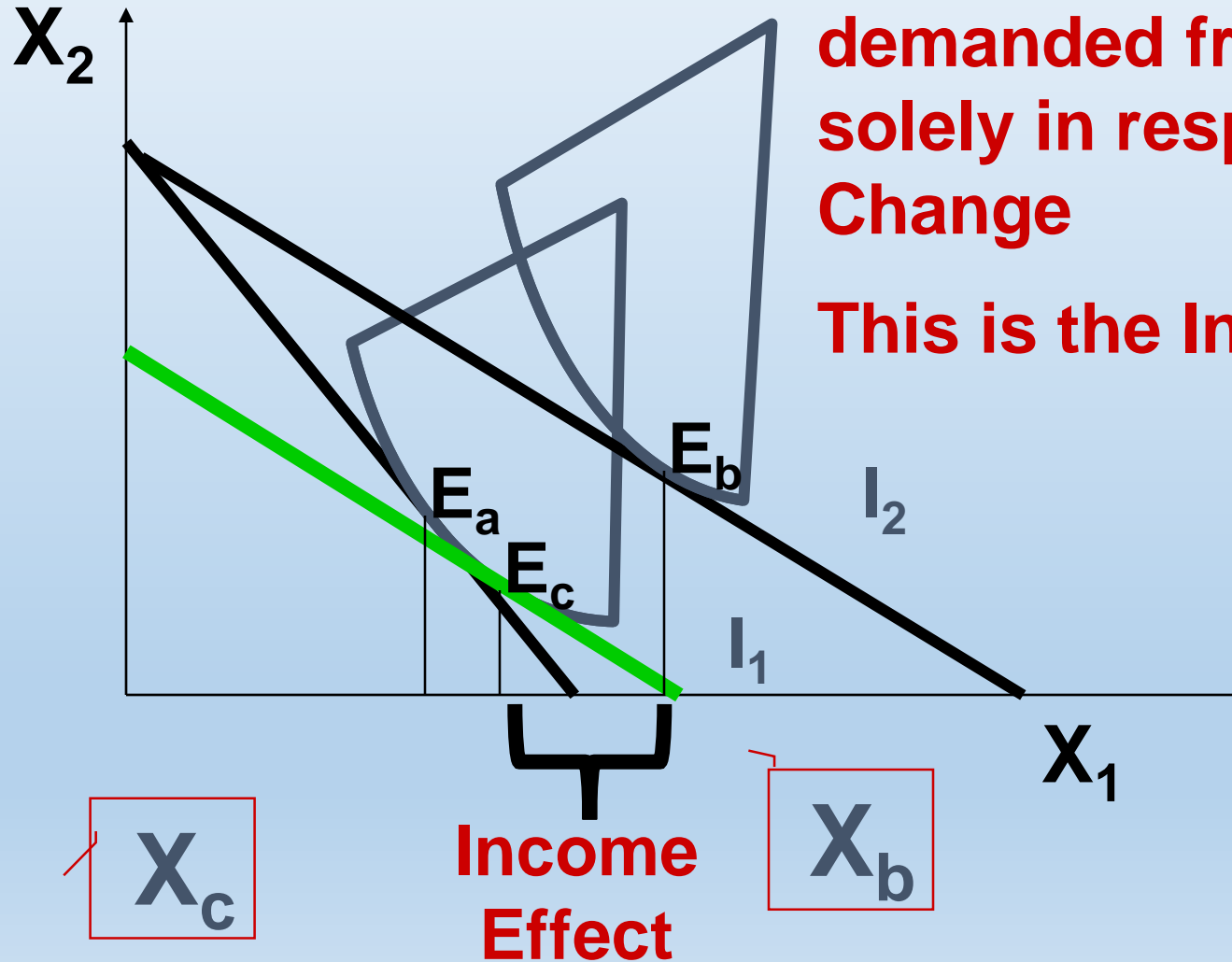
- **substitution effect**   Change in consumption of a good associated with a change in its price, with the level of utility held constant.

- **income effect**   Change in consumption of a good resulting from an increase in purchasing power, with relative prices held constant.

The total effect of a change in price is given theoretically by the sum of the substitution effect and the income effect:

INCOME AND SUBSTITUTION EFFECTS

Figure 4.6

**Income and Substitution Effects:
Normal Good**

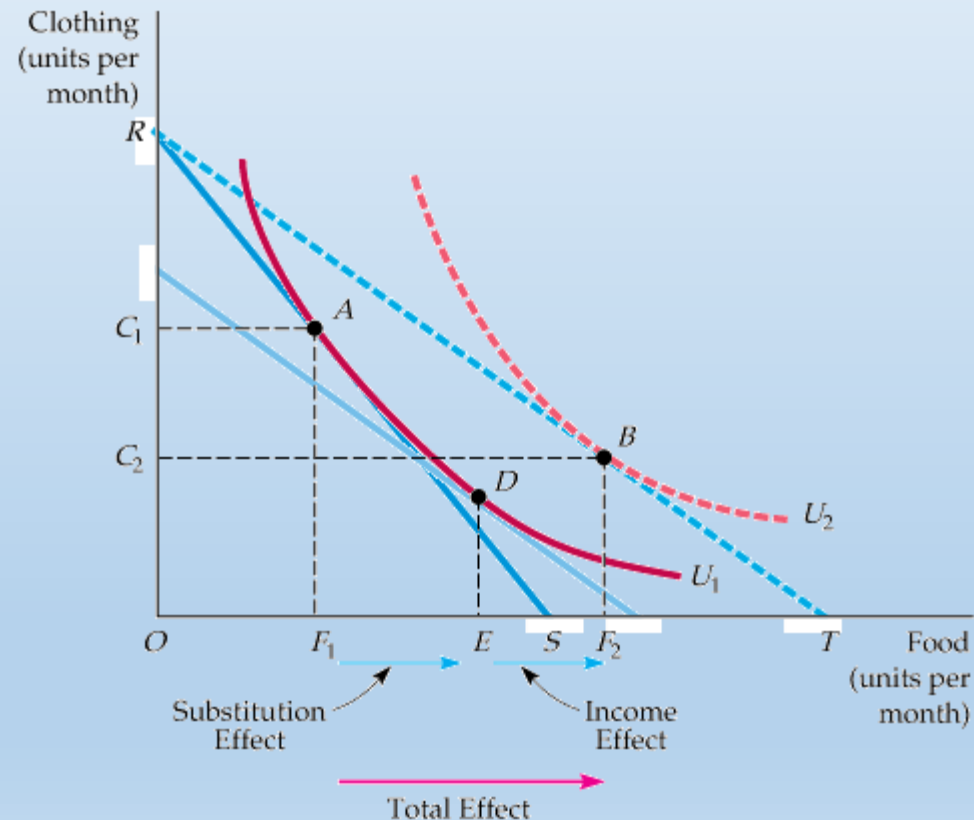A decrease in the price of food has both an income effect and a substitution effect.

The consumer is initially at *A*, on budget line *RS*.

When the price of food falls, consumption increases by F_1F_2 as the consumer moves to *B*.
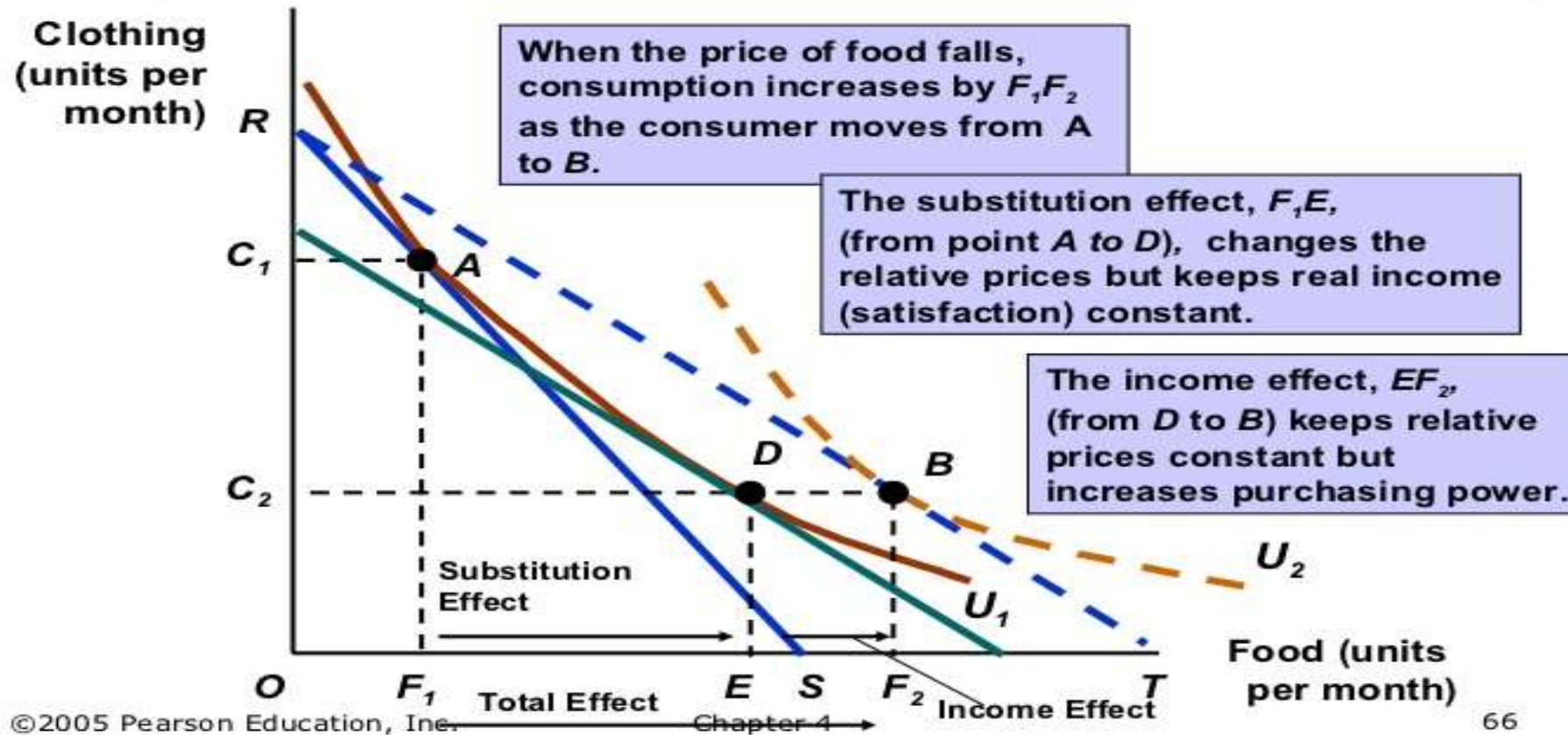
The substitution effect F_1E (associated with a move from *A* to *D*) changes the relative prices of food and clothing but keeps real income (satisfaction) constant.

The income effect EF_2 (associated with a move from *D* to *B*) keeps relative prices constant but increases purchasing power.

Food is a normal good because the income effect EF_2 is positive.

Total Effect (F_1F_2) = Substitution Effect (F_1E) + Income Effect (EF_2)

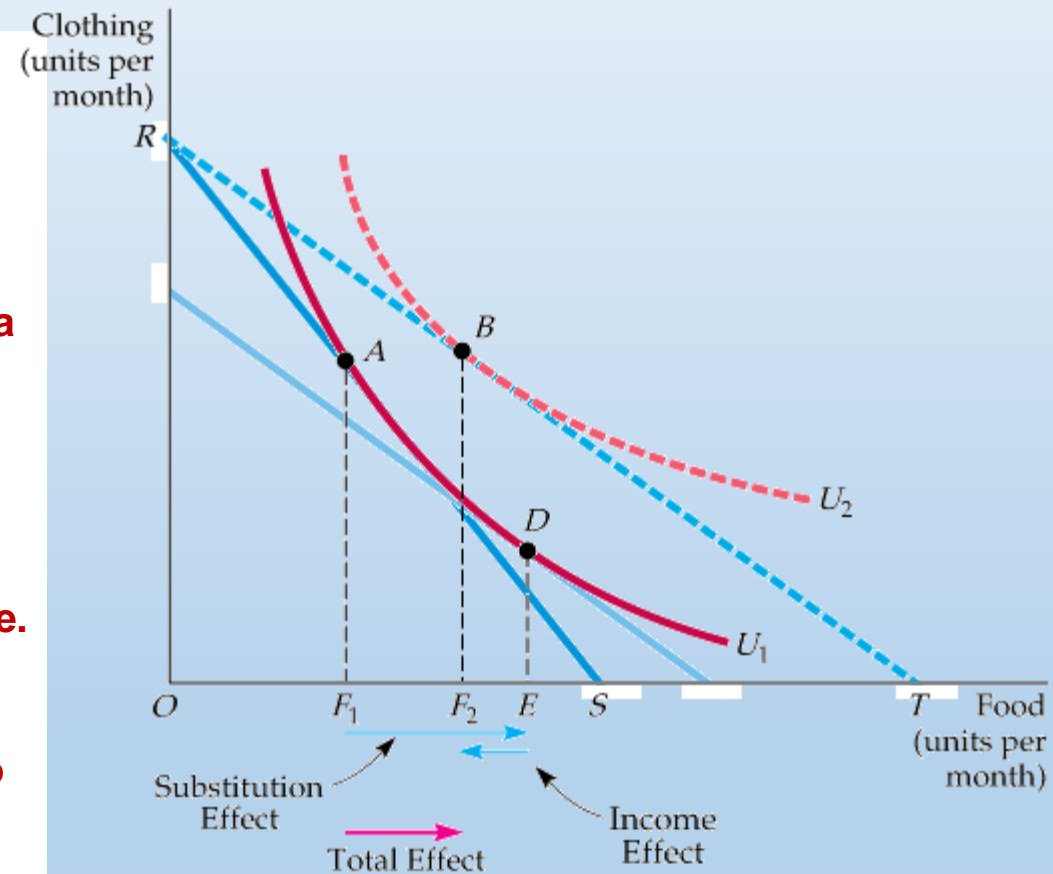# Income and Substitution Effects: Inferior Good

The consumer is initially at *A* on budget line *RS*.

With a decrease in the price of food, the consumer moves to *B*.

The resulting change in food purchased can be broken down into a substitution effect, *F₁E* (associated with a move from *A* to *D*), and an income effect, *EF₂* (associated with a move from *D* to *B*).

In this case, food is an inferior good because the income effect is negative.

However, because the substitution effect exceeds the income effect, the decrease in the price of food leads to an increase in the quantity of food demanded.
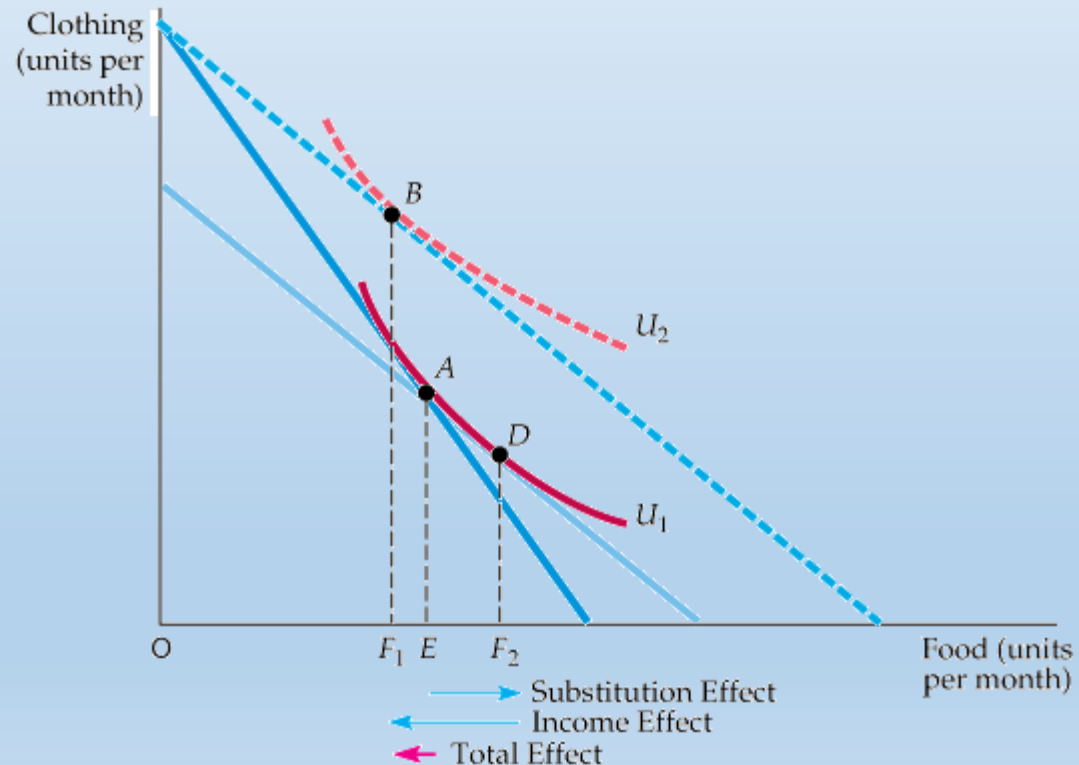
A Special Case: The Giffen Good

● **Giffen good** Good whose demand curve slopes upward because the (negative) income effect is larger than the substitution effect.

Figure 4.8

Upward-Sloping Demand Curve: The Giffen Good

When food is an inferior good, and when the income effect is large enough to dominate the substitution effect, the demand curve will be upward-sloping.
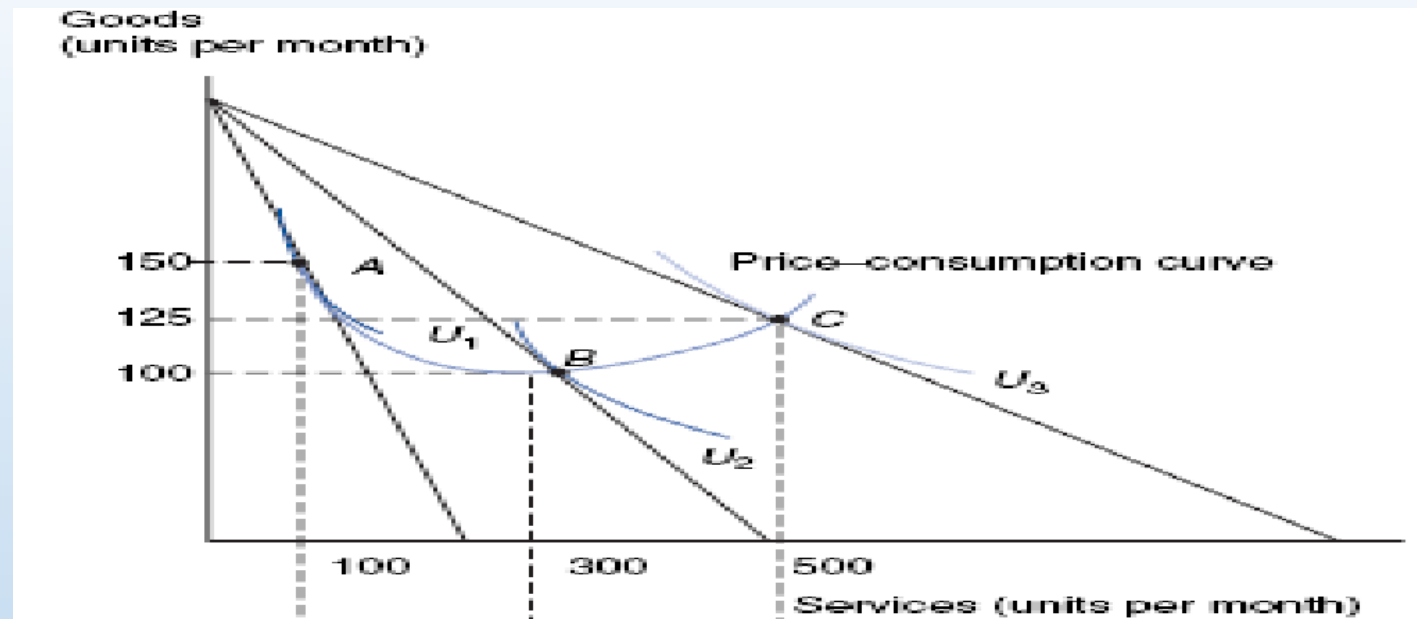
The consumer is initially at point *A*, but, after the price of food falls, moves to *B* and consumes less food.

Because the income effect EF_2 is larger than the substitution effect F_1E, the decrease in the price of food leads to a lower quantity of food demanded.
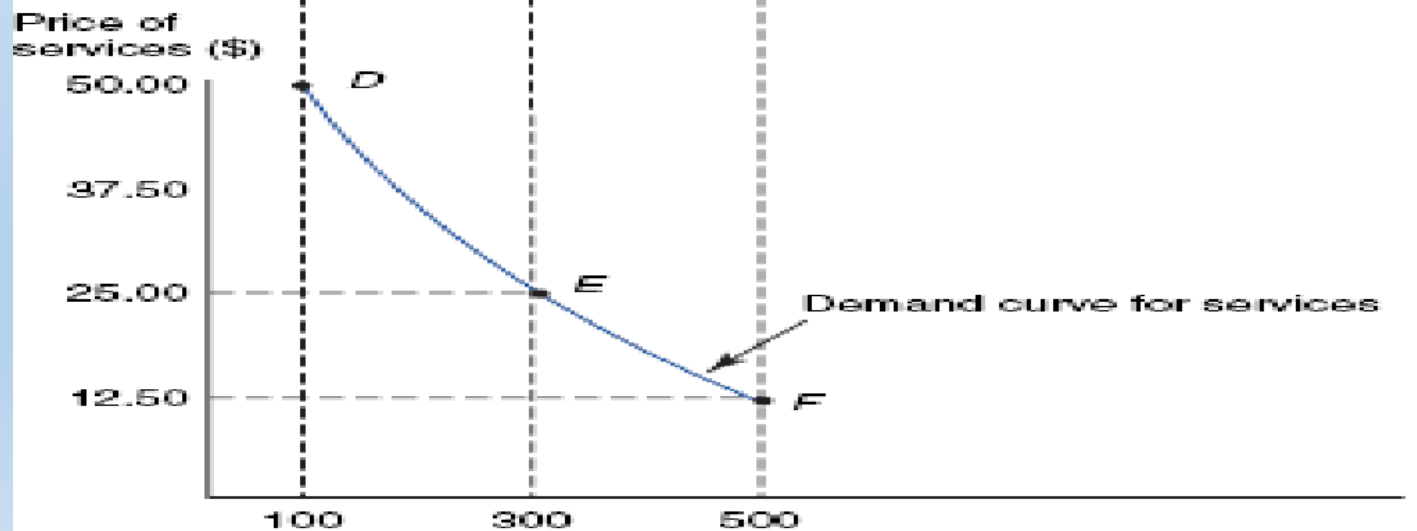
Clothing (units per month)

B

A

D

U_2

U_1

O F_1 E F_2 Food (units per month)

→ Substitution Effect
← Income Effect
← Total Effect

Price Consumption Curve

- Price-consumption curve shows consumption impact of price changes.
 - Reflects movement along demand curve.

Goods (units per month)

150 — A

125 — U_1

100 — B

U_2

C

U_3

Price–consumption curve

100   300   500

Services (units per month)

(b) Demand curves can be derived from price–consumption curves.

Price of services ($)

50.00 — D

37.50

25.00 — E

12.50 — F

Demand curve for services

100   300   500

Income Consumption Curve

- Income-consumption curve shows consumption impact of income changes.
  - Reflects shift from one demand curve to another.

(a) Rising income makes greater consumption possible.

(b) Rising income shifts the demand curve rightward.
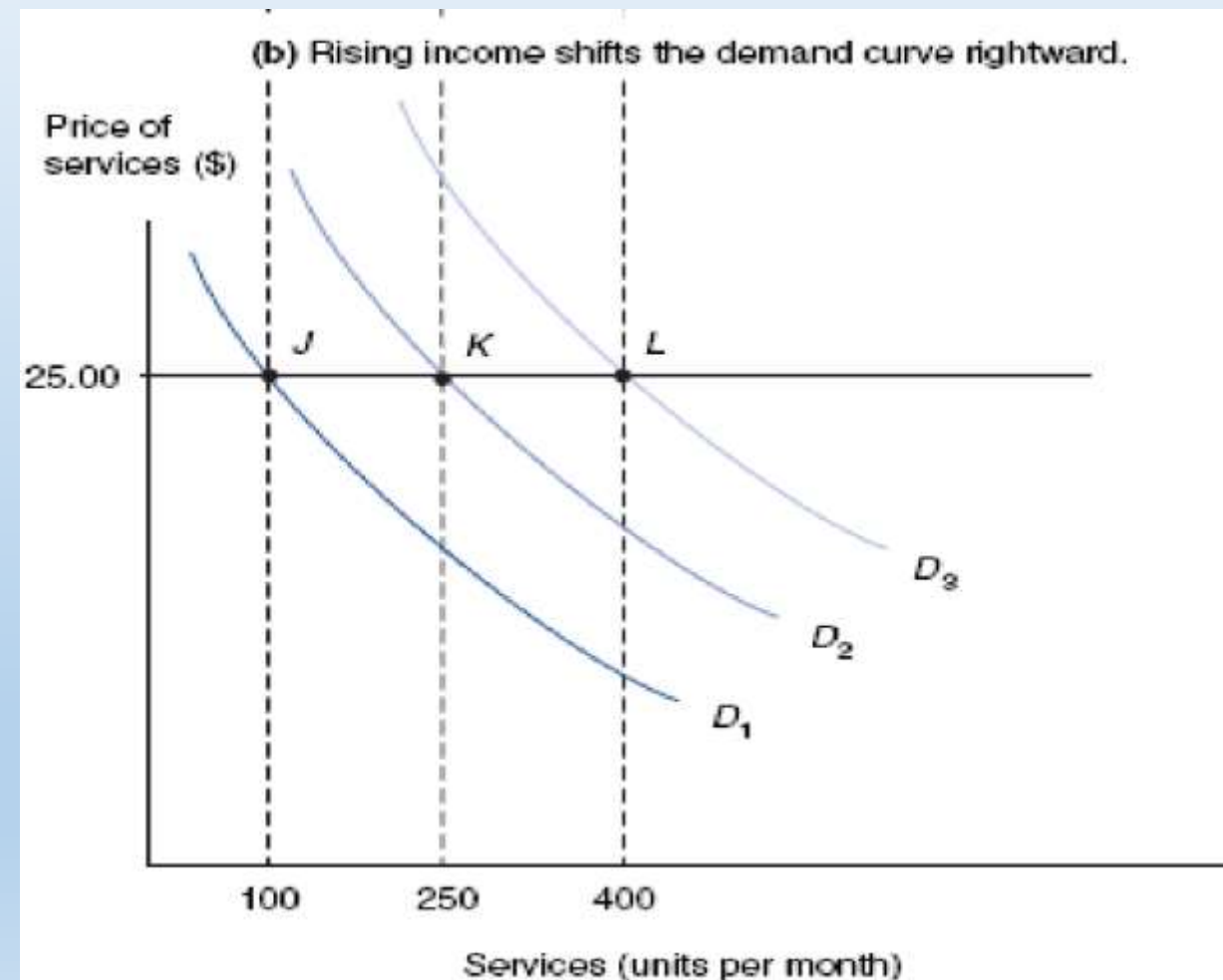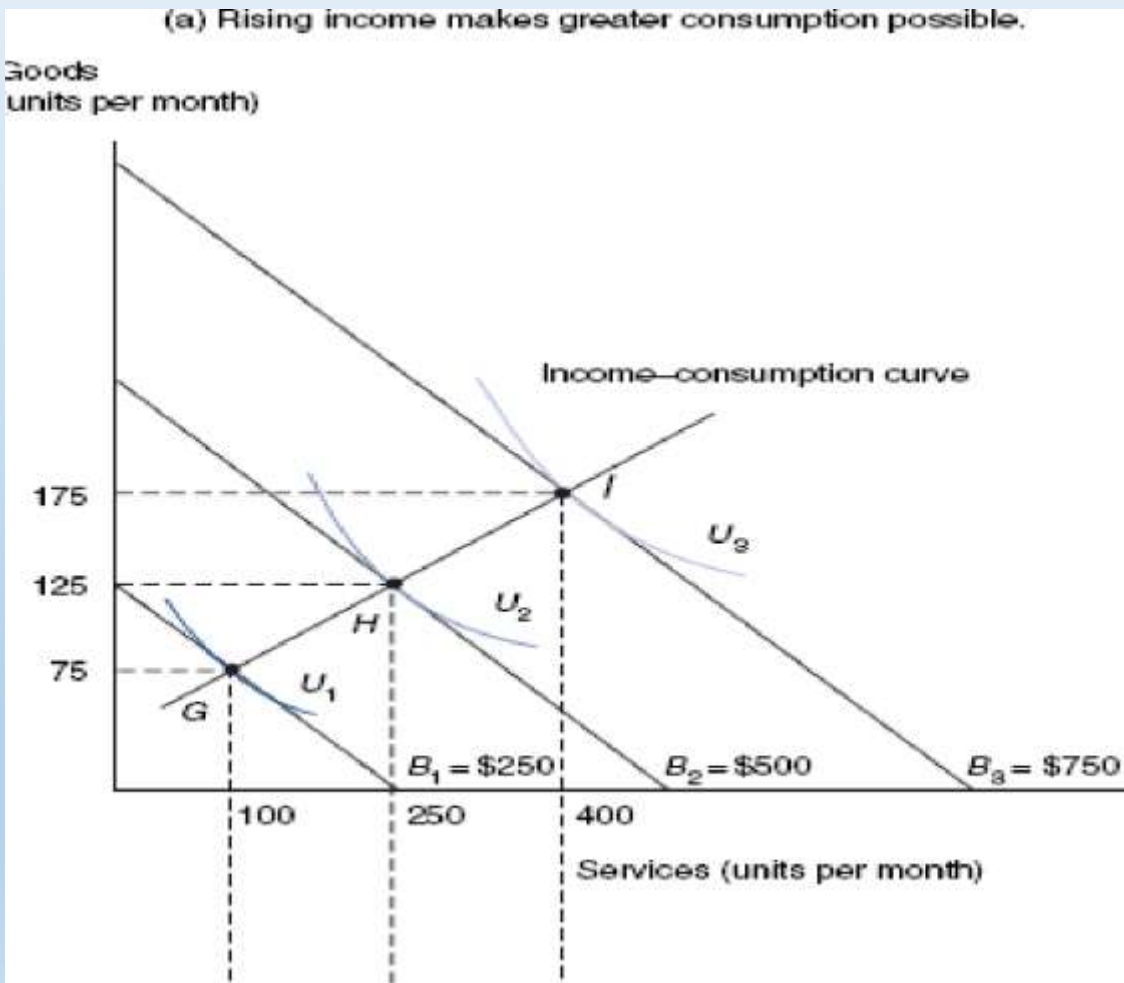
Engel Curve

- Engle curves plot income and consumption.
  - Normal good consumption rises with income.
  - Inferior good consumption falls with income rise.

(a) Engle curves are upward sloping for normal goods.

(b) Engle curves become backward-bending for inferior goods.