Individual and Market Demand

Introduction (1/2)

5

Chapter Outline

5.1 How Income Changes Affect an Individual's Consumption Choices

5.2 How Price Changes Affect Consumption Choices

5.3 Consumer Responses to Price Changes: Substitution and Income Effects

5.4 The Impact of Changes in Another Good's Price: Substitutes and Complements

5.5 Combining Individual Demand Curves to Obtain the Market Demand Curve

5.6 Conclusion

Introduction (2/2)

With the consumer choice framework in place, we now link consumer decisions with individual and market demand.

These links help determine:

- why shifts in tastes affect prices.
- the benefits products offer consumers.
- what happens to purchase patterns as consumers (or even entire countries) become wealthier.
- how changes in the price of one good affect the demand for other goods.
- what factors determine consumers' responses to price changes.

How Income Changes Affect an Individual's Consumption Choices (1/12)

5.1

The **income effect** is the change in a consumer's consumption choices that results from a change in the consumer's income (or purchasing power), holding relative prices constant.

Is higher income associated with higher consumption of goods?

It depends!

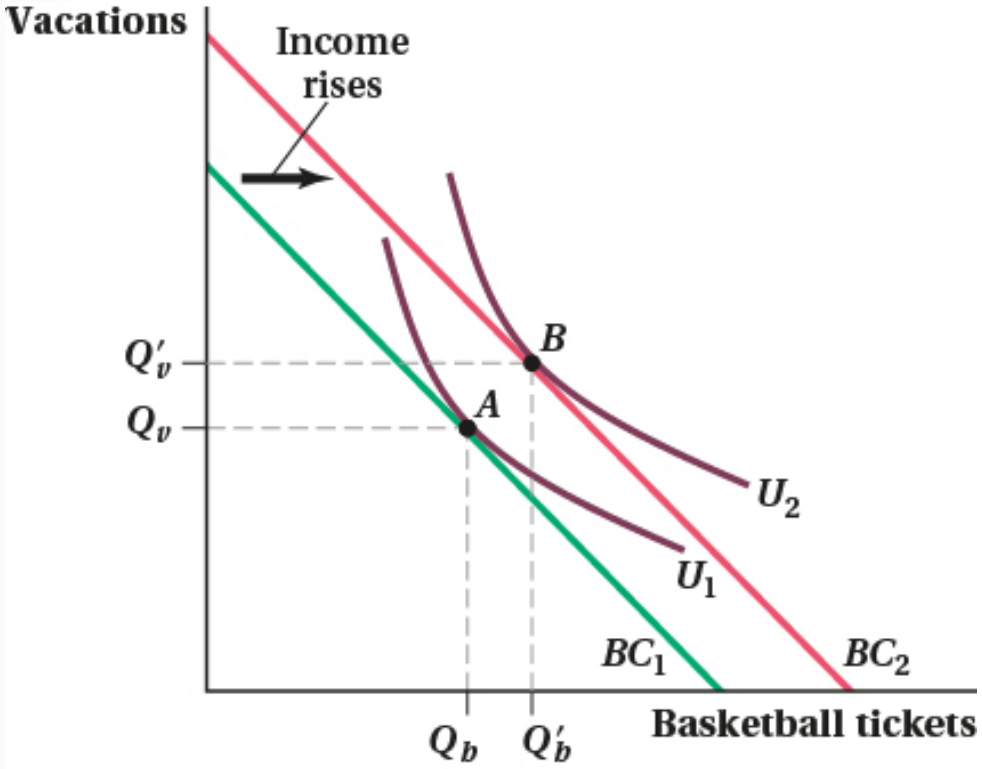
For **normal goods**, higher income is associated with rising consumption.

- For instance, consider vacations and basketball tickets, both of which are considered normal goods.

How Income Changes Affect an Individual's Consumption Choices (2/12)

5.1

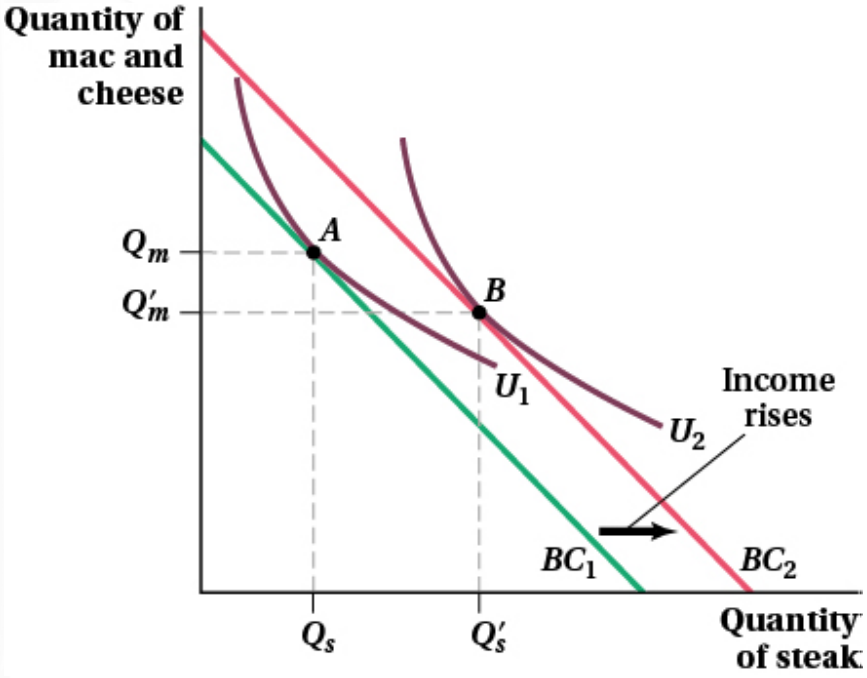
Figure 5.1 A Consumer's Response to an Increase in Income When Both Goods Are Normal



How Income Changes Affect an Individual's Consumption Choices (3/12)

Alternatively, for **inferior goods**, higher income is associated with *falling* consumption.

Figure 5.2 Consumer's Response to an Increase in Income When One Good is Inferior



How Income Changes Affect an Individual's Consumption Choices (4/12)

5.1

Income Elasticities and Types of Goods

Chapter 2 introduced the concept of **elasticity.**

- **Income elasticity** describes the response of demand to changing income.
  - Specifically, the percentage change in quantity consumed associated with a percentage change in income

Mathematically, $$E_I^D = \frac{\%\Delta Q}{\%\Delta I} = \frac{\Delta Q / Q}{\Delta I / I} = \frac{\Delta Q}{\Delta I}\frac{I}{Q}$$

where I is income and Q is the quantity of a good demanded.

The **income effect** is given by $\frac{\Delta Q}{\Delta I}$

How Income Changes Affect an Individual's Consumption Choices (5/12)

Income Elasticities and Types of Goods

Thus, the sign of the income elasticity is the same as the income effect.

If $E_I^D > 0 \Rightarrow \frac{\Delta Q}{\Delta I} > 0$, the good in question is a **normal good.**

If $E_I^D < 0 \Rightarrow \frac{\Delta Q}{\Delta I} < 0$, the good in question is an **inferior good.**

How Income Changes Affect an Individual's Consumption Choices (6/12)

There are two additional sub-types of goods that are common, both of these are classified as **normal goods** because, as income increases, the quantity demanded for them increases as well, and vice versa.

- **Necessity goods**: normal goods for which income elasticity is between 0 and 1
  - Examples: water consumption, electricity, clothing, etc…
- **Luxury goods**: normal goods for which income elasticity is greater than 1
  - Examples: vacation homes, jewelry, expensive steaks, etc…

How Income Changes Affect an Individual's Consumption Choices (7/12): Question 1

5.1

If the consumption of fresh cut flowers increases by 10% when consumers' incomes increase by 5%, fresh cut flowers are:

A. inferior goods.
B. necessity goods.
C. luxury goods.
D. ordinary goods.

How Income Changes Affect an Individual's Consumption Choices (7/12): Question 1 – Correct Answer

5.1

If the consumption of fresh cut flowers increases by 10% when consumers' incomes increase by 5%, fresh cut flowers are:

A. inferior goods.
B. necessity goods.
C. luxury goods. (correct answer)
D. ordinary goods.

How Income Changes Affect an Individual's Consumption Choices (8/12)

5.1

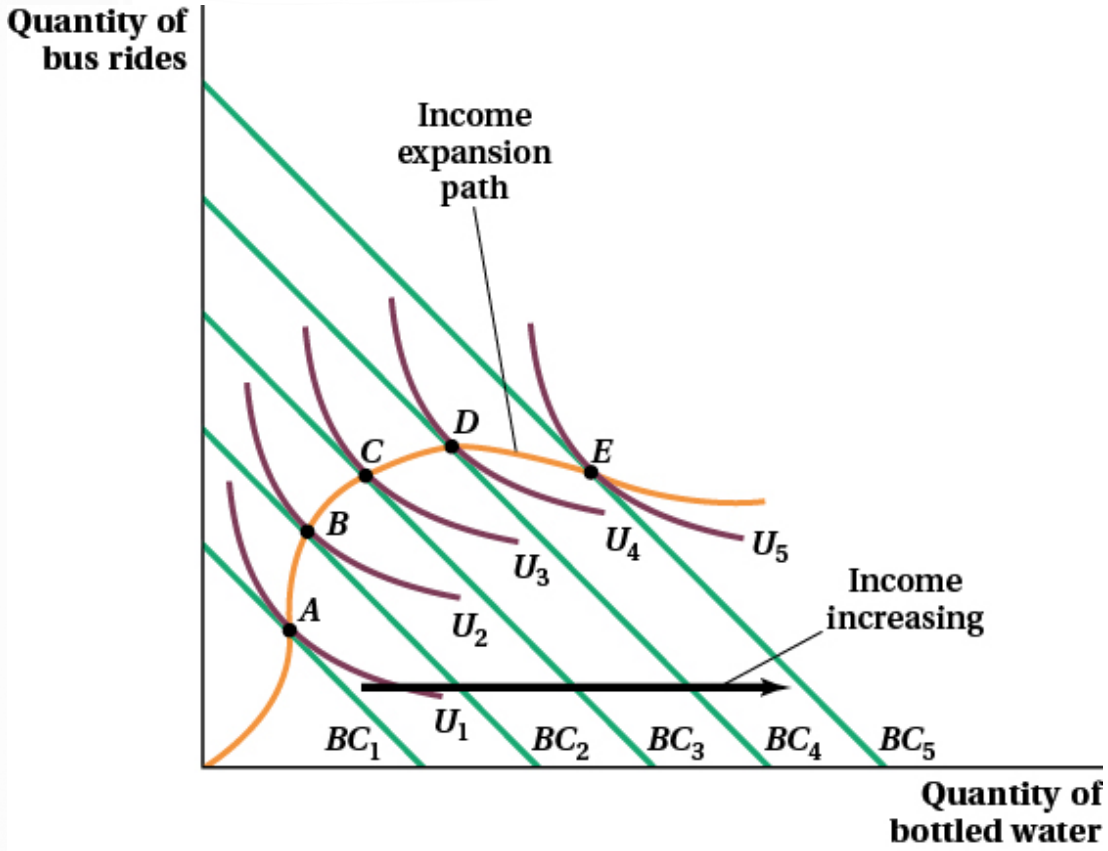
Income expansion path: a curve that connects a consumer's optimal bundles at each income level

- Only two goods can be represented.
- When both goods are normal goods, the path is positively sloped.
- If the slope of the income path is negative, one of the goods is an inferior good.
- Income levels can't be directly observed on the curve because both axes represent quantities of goods.

How Income Changes Affect an Individual's Consumption Choices (9/12)

5.1

Figure 5.3 The Income Expansion Path



How Income Changes Affect an Individual's Consumption Choices (10/12)

5.1

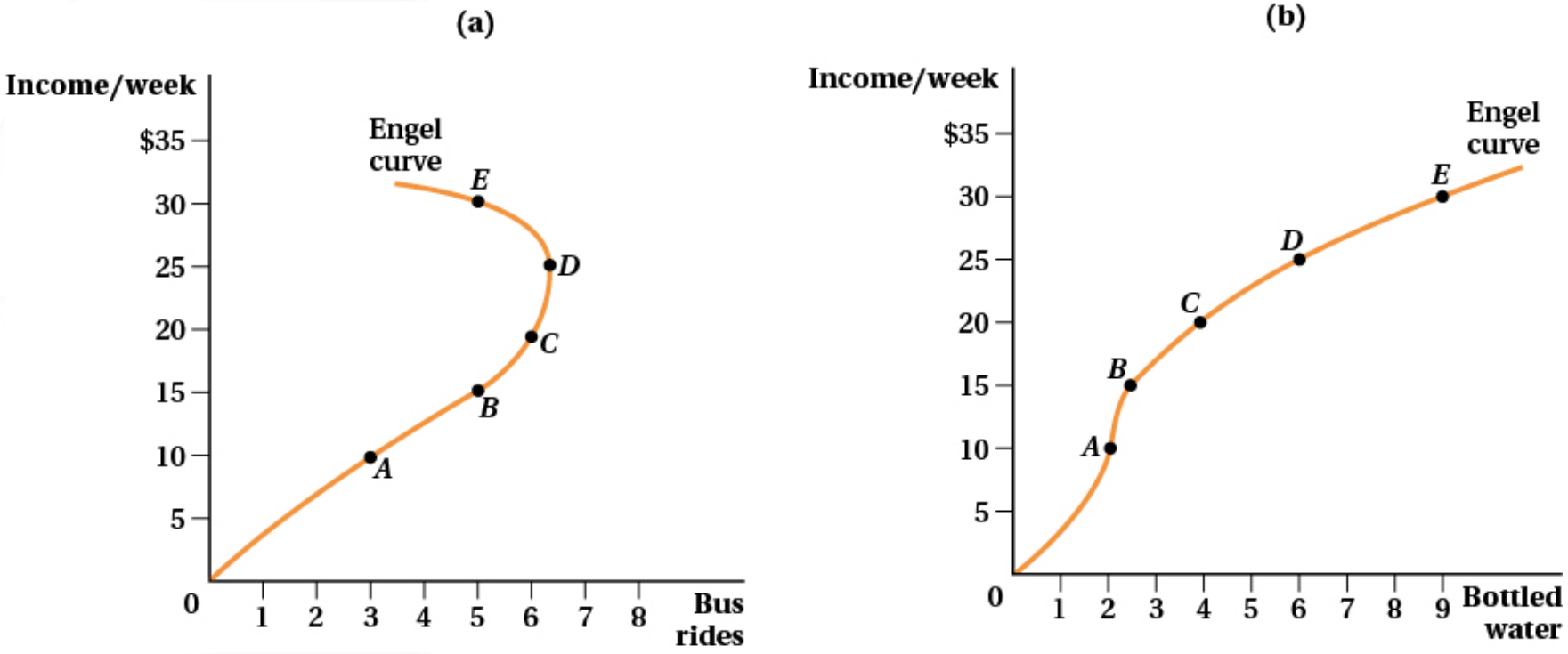
A more common way to describe the consumption-income relationship is with an **Engel curve.**

- Shows the relationship between quantity of a good consumed and a consumer's income
- If the Engel curve has a positive slope, the good is a normal good at that income level.
- If the Engel curve has a negative slope, the good is an inferior good at that income level.

How Income Changes Affect an Individual's Consumption Choices (11/12)

5.1

Figure 5.4 An Engel Curve Shows How Consumption Varies with Income



How Income Changes Affect an Individual's Consumption Choices (12/12): Question 2

5.1

Susan's income elasticity for canned meat is negative at each of her income levels and is positive for organic fruit. This implies that Susan's income expansion path along her optimal canned meat and organic fruit bundles will have a _____ slope, and the Engel curve for canned meat will have a _____ slope.

A. positive; positive
B. positive; negative
C. negative; positive
D. negative; negative

How Income Changes Affect an Individual's Consumption Choices (12/12): Question 2 – Correct Answer

5.1

Susan's income elasticity for canned meat is negative at each of her income levels and is positive for organic fruit. This implies that Susan's income expansion path along her optimal canned meat and organic fruit bundles will have a _____ slope, and the Engel curve for canned meat will have a _____ slope.

A. positive; positive
B. positive; negative
C. negative; positive
D. negative; negative (correct answer)

How Price Changes Affect Consumption Choices (1/4)

5.2

Just as income affects consumer choices, *changes in relative prices*—holding income constant—also affects these choices.

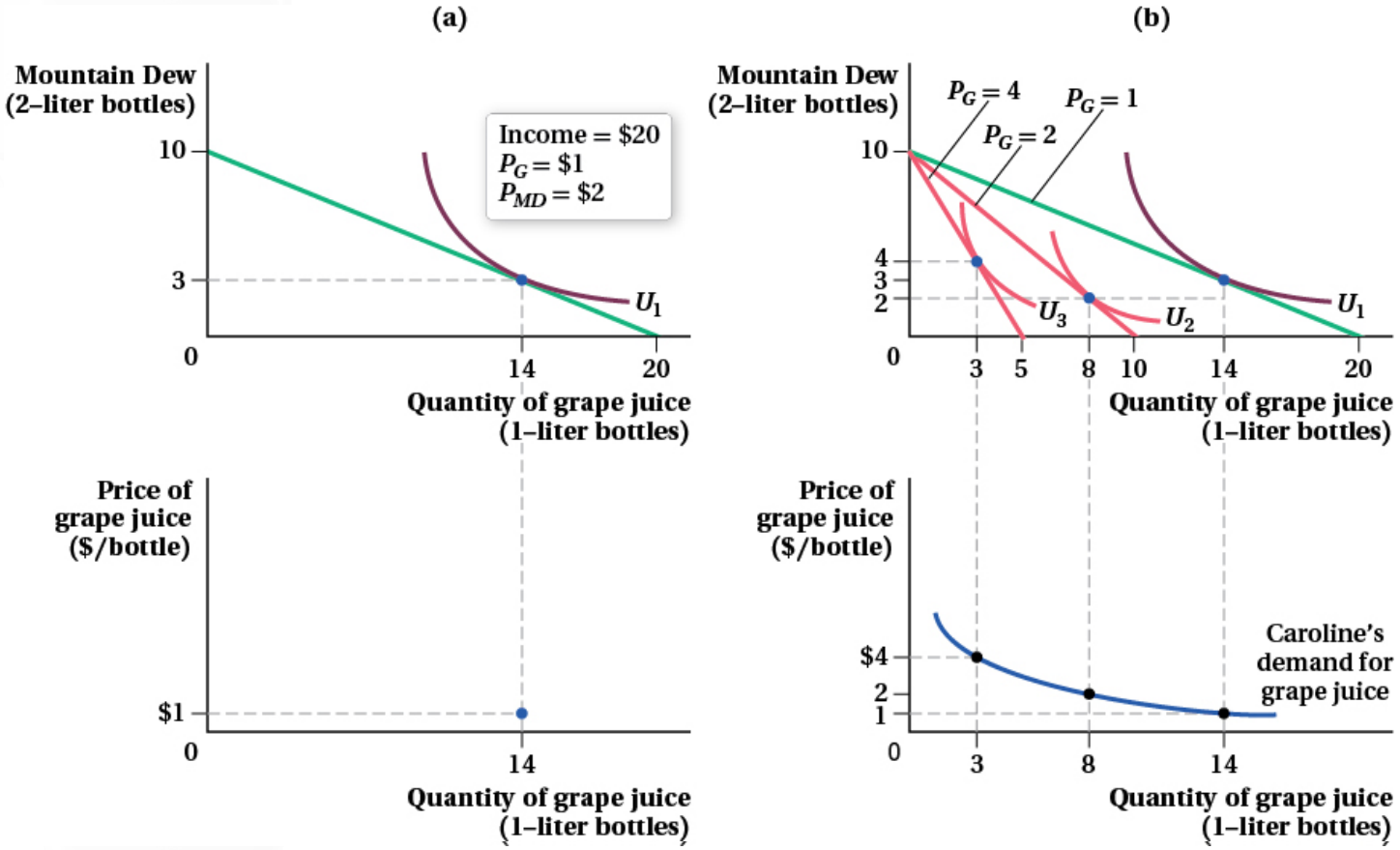
Deriving a Demand Curve

- Demand curves define a relationship between quantity demanded and price.
- To derive a demand curve, we must understand how a consumer responds to a change in price.
- By changing one price on an indifference curve—budget constraint map, we can observe changes to consumer choices and then build the demand curve for an individual using these observed changes.
- The observed price represents the maximum willingness to pay for the last unit consumed.

How Price Changes Affect Consumption Choices (2/4)

5.2

Figure 5.5 Building an Individual's Demand Curve



How Price Changes Affect Consumption Choices (3/4)

5.2

Shifts in the Demand Curve

When consumer preferences, income, or the prices of other goods change, the demand curve will shift.

Consider the example of Mountain Dew and grape juice from the previous figure.

- Imagine the consumer (Caroline) prefers the taste of Mountain Dew, but had previously limited consumption due to worries about high fructose corn syrup.
- After hearing advertisements from the Corn Refiners Association claiming corn syrup is identical to cane sugar, her fears are reduced.

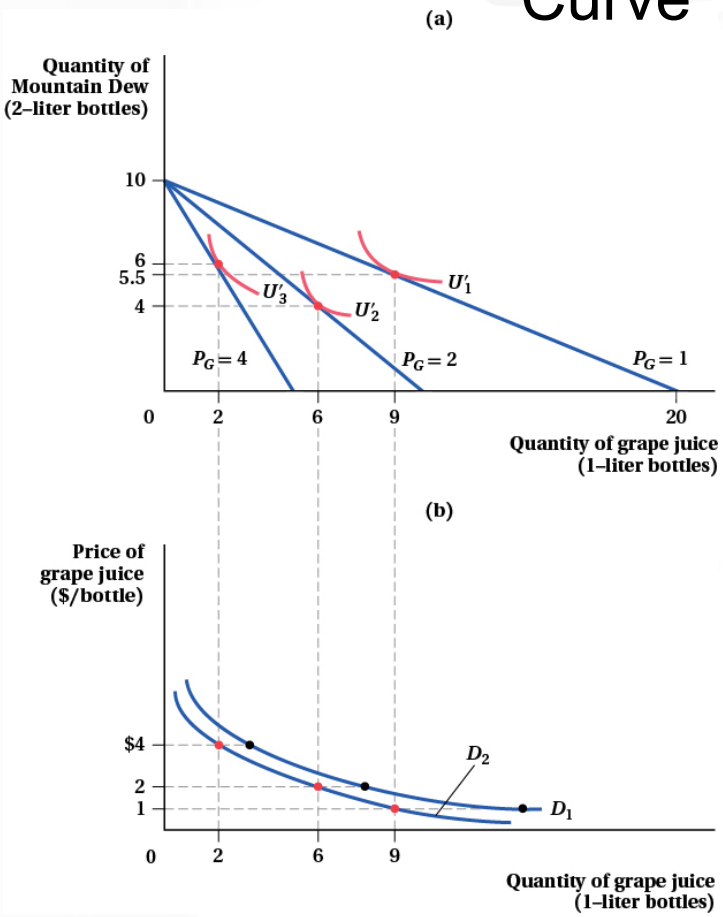
What might happen to the demand for grape juice?

– In order to consume more Mountain Dew, she might reduce her consumption of grape juice.

How Price Changes Affect Consumption Choices (4/4)

5.2

Figure 5.6 Preference Changes and Shifts in the Demand Curve



(a) Caroline's indifference curves for grape juice flatten when her preference for grape juice decreases relative to her preference for Mountain Dew. At each price level, she now consumes fewer bottles of grape juice.

(b) Because she purchases fewer bottles of grape juice at each price point, Caroline's demand curve for grape juice shifts inward from D_1 to D_2.

Consumer Responses to Price Changes: Substitution and Income Effects (1/16)

5.3

When the price of a good changes relative to another, two things happen:

1. One good becomes relatively more expensive, and the other relatively less.
2. The total purchasing power of a consumer's income changes.

The **substitution effect** refers to the change in a consumer's consumption choices that results from a change in the relative prices of two goods.

Always negative; when the price of one good relative to another increases, consumption of the former falls, and vice versa.

Consumer Responses to Price Changes: Substitution and Income Effects (2/16)

5.3

The **income effect** refers to the change in a consumer's consumption choices that results from a change in the purchasing power of the consumer's income.

- This is the same income effect from Section 5.1.
- Can be negative or positive (inferior or normal goods)

The **total effect** of a change in a price is the sum of the substitution and income effects.

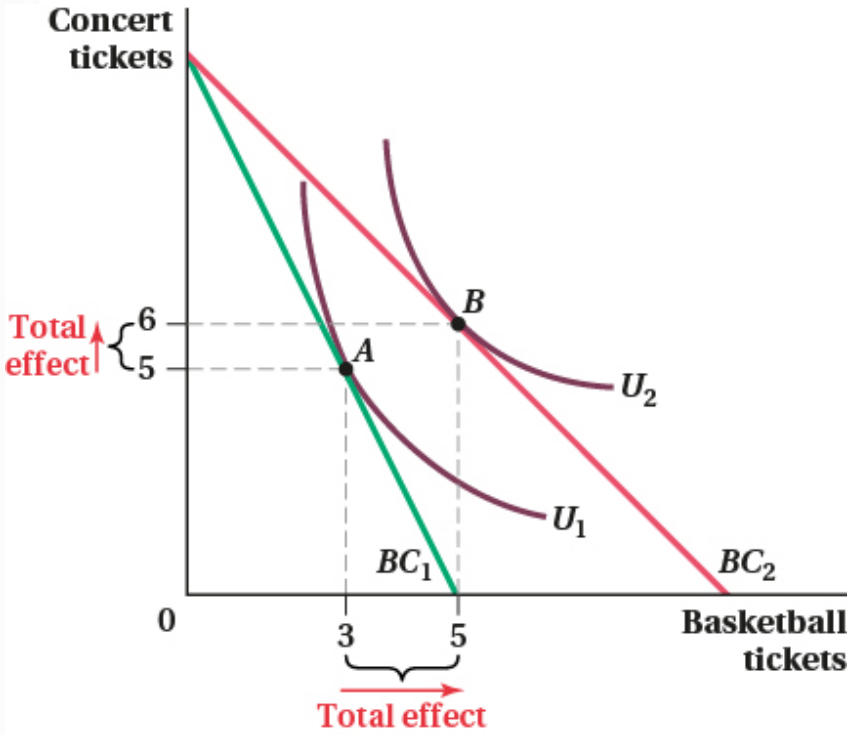
- The total effect is simply the observed change in consumption of a good after a price change.

$$\text{Total Effect} = \text{Substitution Effect} + \text{Income Effect}$$

Consumer Responses to Price Changes: Substitution and Income Effects (3/16)

5.3

Figure 5.7 The Effects of a Fall in the Price of Basketball Tickets



Consumer Responses to Price Changes: Substitution and Income Effects (4/16)

5.3

$$\text{Total Effect} = \text{Substitution Effect} + \text{Income Effect}$$

Isolating the Substitution Effect

- Determine the bundle of goods that would have been chosen at the *new* price while maintaining utility experienced *before* the price change.

Isolating the Income Effect

- The change in quantities demanded due to the changes in the consumer's purchasing power *after* the change in prices

Consumer Responses to Price Changes: Substitution and Income Effects (5/16)

5.3

Graphically

Substitution Effect:

- To do this for a fall in the price of basketball tickets, shift the *new* budget constraint (BC_2) inward until it is tangent with the *old* indifference curve (BC').
- Movement along the *original* indifference curve (A to A')

Income Effect:

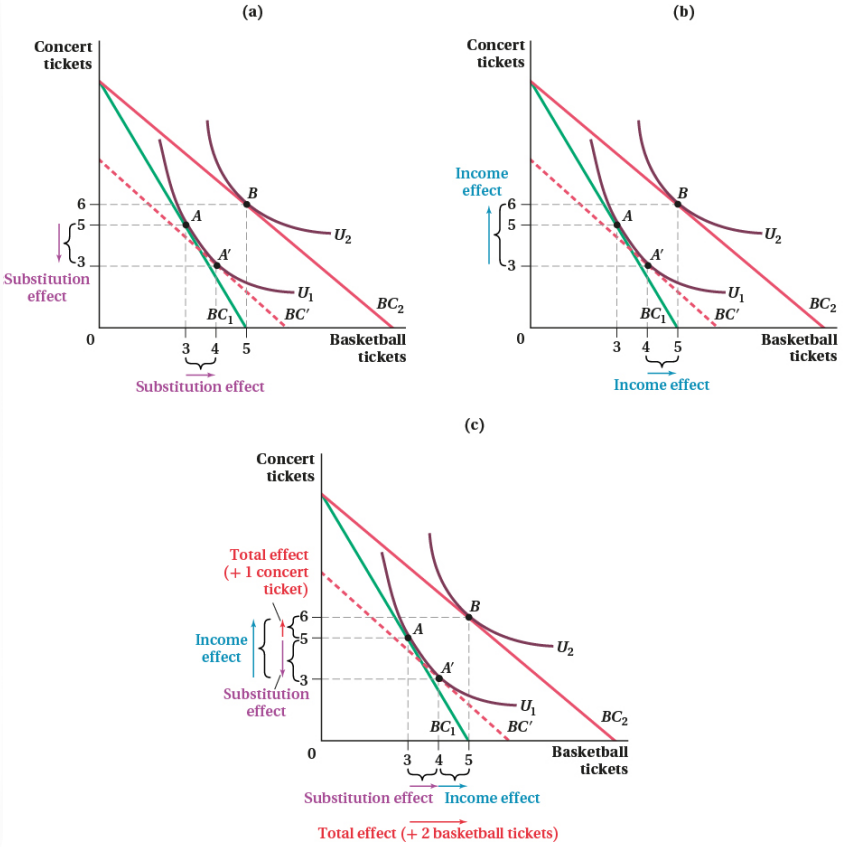
When the price of basketball tickets decreases, the consumer can afford to purchase a larger bundle than before.

- Represented by the change in the quantity of goods consumed from bundle A' (after the substitution effect) to bundle B

Consumer Responses to Price Changes: Substitution and Income Effects (6/16)

5.3

Figure 5.8 Substitution Effects and Income Effects for Two Normal Goods



Consumer Responses to Price Changes: Substitution and Income Effects (7/16)

5.3

Three steps to computing substitution and income effects associated with a price change, starting with a consumer at an optimal bundle A:

1. Draw the new budget constraint and find the new optimal bundle (B).
   - A price change for one of two goods rotates or pivots the constraint.

2. Draw a line parallel to the *new* budget constraint, but tangent to the *old* indifference curve; determine the optimal bundle on the old curve associated with this theoretical budget constraint (A').

3. The **substitution effect** is the difference in quantities between A and A' and the **income effect** is the difference in quantities between A' and B.

Consumer Responses to Price Changes: Substitution and Income Effects (8/16)

5.3

What Determines the Size of the Substitution and Income Effects?

1. **Curvature**: The size of the ***substitution effect*** depends on the curvature of indifference curves.

What does it mean when an indifference curve is relatively straight?

- The 2 goods are relatively substitutable.

Is the substitution effect larger or smaller along a straighter indifference curve?

- Larger, more substitutable = Larger substitution effect

Consumer Responses to Price Changes: Substitution and Income Effects (9/16)

5.3

2. **Quantity consumed before the price change**: The ***income effect*** increases with the amount spent on a good before a price change.

Why does the income effect increase with the amount spent on a good?

The more you can get from trading off consumption of that good

Consumer Responses to Price Changes: Substitution and Income Effects (10/16)

5.3

Example of the Substitution and Income Effects for an Inferior Good

It is important to see how the income and substitution effects are opposed to one another with an inferior good.

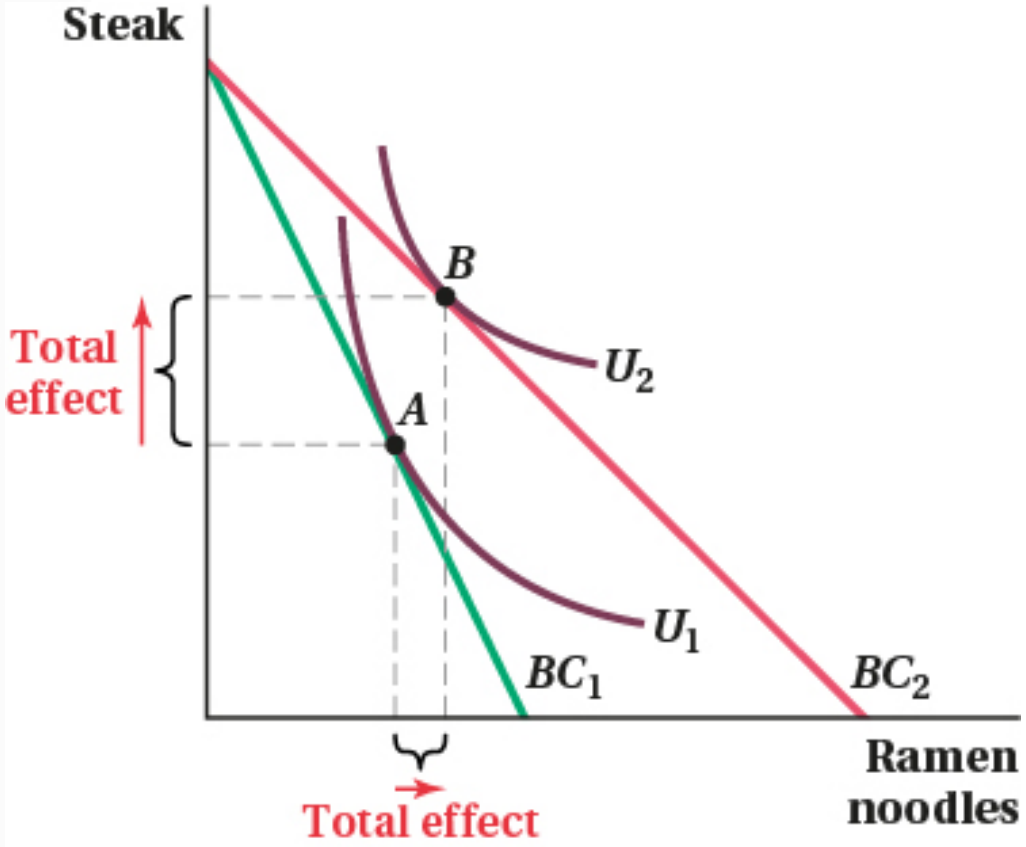
Consider a consumer choosing bundles of steak and ramen noodles.

- Suppose the price of ramen noodles (an inferior good) falls.
- Total effect followed by Income and Substitution effects graphically

Consumer Responses to Price Changes: Substitution and Income Effects (11/16)

5.3

Figure 5.10 A Fall in the Price of an Inferior Good



Consumer Responses to Price Changes: Substitution and Income Effects (12/16)

5.3

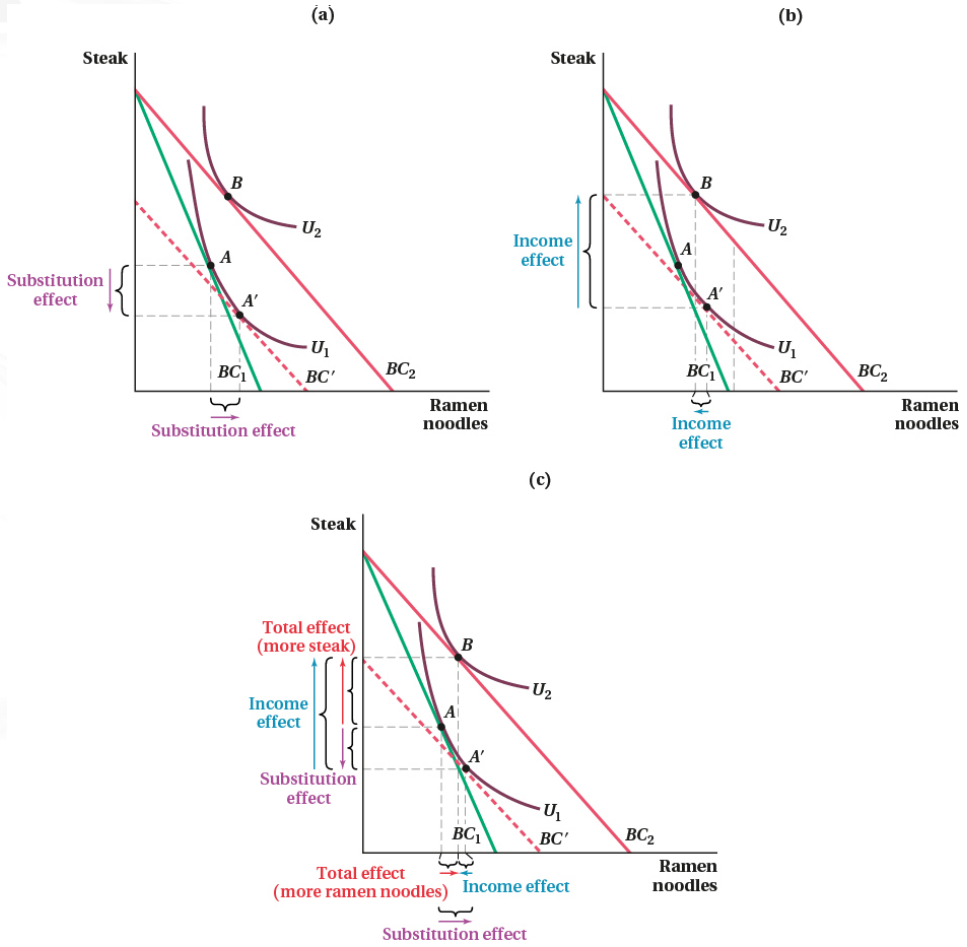
Figure 5.11 Substitution and Income Effects for an Inferior Good

Changes:

1. **Price of ramen noodles has *decreased***
   - Sub. Effect positive
2. **Relative price of steak has *increased***
   - Sub. Effect negative
3. **Relative income has *increased***
   - Income effect positive for steak (normal good) and negative for ramen (inferior good)

The income effect dominates the substitution effect for steak.

The substitution effect dominates the income effect for ramen noodles.



Consumer Responses to Price Changes: Substitution and Income Effects (13/16)

5.3

Giffen goods: goods for which a fall in price leads the consumer to want *less* of the good

- Inferior goods, but the income effect outweighs the substitution effect
- When the price of a Giffen good *drops*, the substitution effect (which acts to increase demand) is smaller than the income effect
  - **Results in an upward sloping demand curve!**

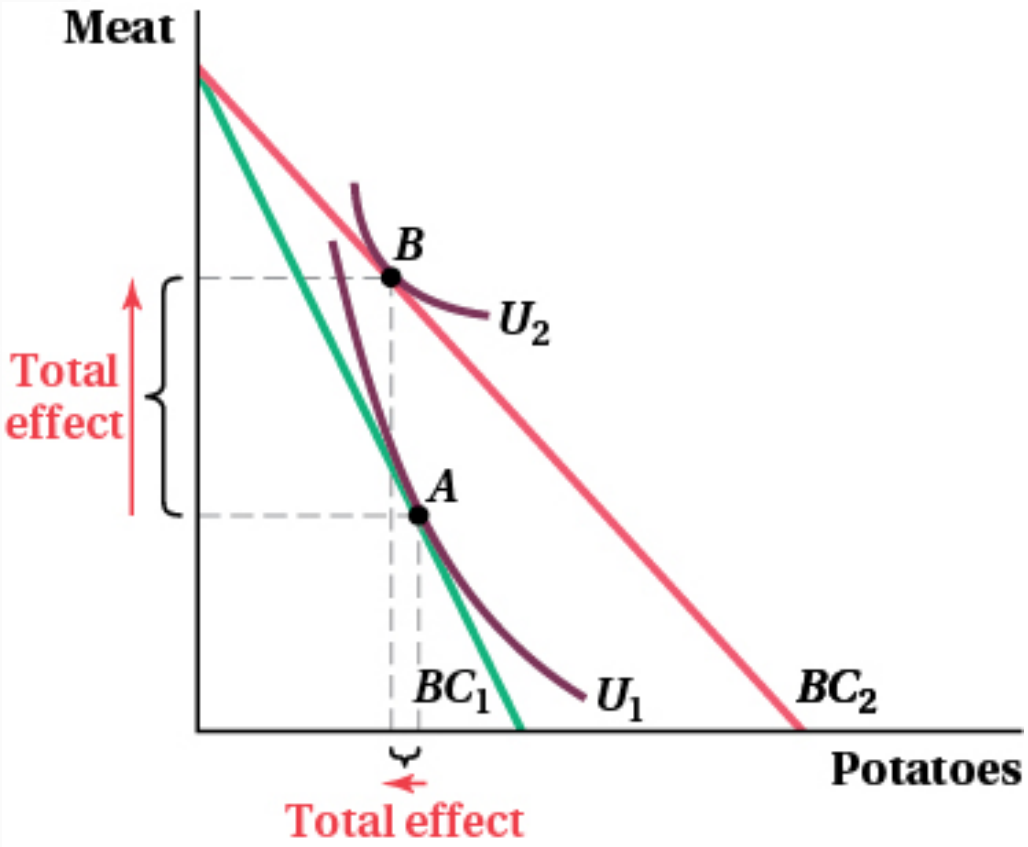
Economists sometimes question whether Giffen goods actually exist

- The few examples with humans tend to focus on very poor households and commodity crops (e.g., rice and potatoes)

Consumer Responses to Price Changes: Substitution and Income Effects (14/16)

5.3

Figure 5.12 A Change in the Price of a Giffen Good



Consumer Responses to Price Changes: Substitution and Income Effects (15/16)

5.3

Simple Rules About Income and Substitution Effects

Substitution Effects

- Involve comparisons of bundles that line on the same indifference curve.
- The direction of the effect on quantity consumed for a given change in the relative price of the good is unambiguous.
- If the good's relative price falls, the substitution effect causes the consumer to want more of it.
- If the good's relative price rises, the substitution effect causes the consumer to want less of it.

Income Effects

- Involve comparisons of bundles that lie on two different indifference curves.
- The direction of the effect on quantity consumed for a given change in the relative price of the good is ambiguous and depends on whether the good is normal or inferior.
- If the good is normal, then a fall in either its price or the price of the other good will cause the consumer to want more of it. (A drop in any price, even of another good, increases the effective income of the consumer.) If the good is inferior, then a price drop will cause the consumer to want less of it.
- If the good is normal, then a rise in it's price or the price of the other good will cause the consumer to want less of it. If the good is inferior, then a rise in either price will cause the consumer to want more of it.

Consumer Responses to Price Changes: Substitution and Income Effects (16/16): Question 1

5.3

At his current income level, Randall's income elasticity for frozen dinners is -0.75. If the price of frozen dinners decreases by 10%, the substitution effect will cause Randall to _____ his consumption of frozen dinners, and the income effect will cause Randall to _____ his consumption of frozen dinners.

A. increase; increase
B. increase; decrease
C. decrease; increase
D. decrease; decrease

Consumer Responses to Price Changes: Substitution and Income Effects (16/16): Question 1 – Correct Answer

5.3

At his current income level, Randall's income elasticity for frozen dinners is -0.75. If the price of frozen dinners decreases by 10%, the substitution effect will cause Randall to _____ his consumption of frozen dinners, and the income effect will cause Randall to _____ his consumption of frozen dinners.

A. increase; increase
B. increase; decrease (correct answer)
C. decrease; increase
D. decrease; decrease

The Impact of Changes in Another Good's Price: Substitutes and Complements (1/6)

5.4

A Change in the Price of a Substitute Good

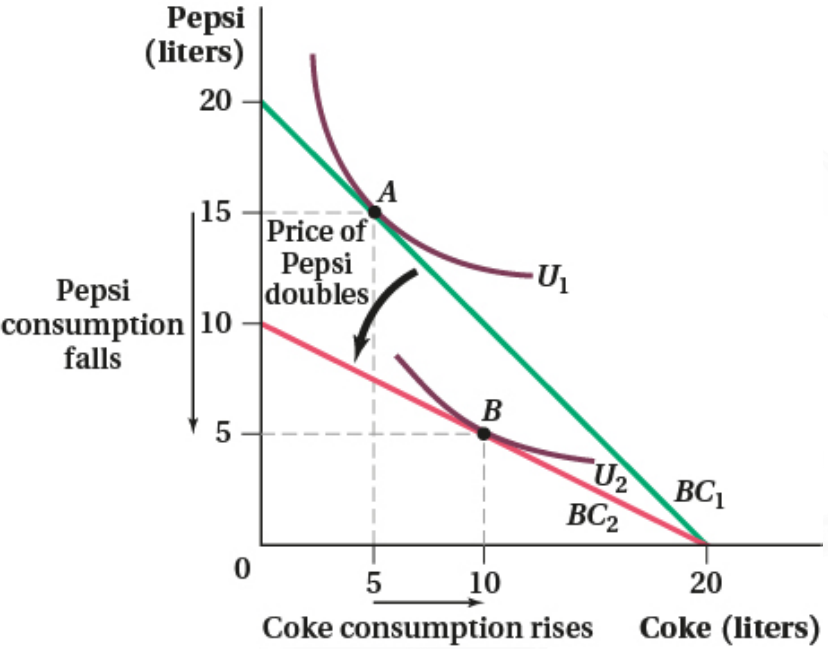
When the price of a **substitute** good increases, we expect consumption of the primary good to increase.

- Consider Pepsi and Coke

The Impact of Changes in Another Good's Price: Substitutes and Complements (2/6)

5.4

Figure 5.13 When the Price of a Substitute Rises, Demand Rises



At original prices, this consumer purchases 15 bottles of Pepsi and 5 bottles of Coke.

When the price of Pepsi doubles, Coke consumption increases by 100% (to 10 bottles), and Pepsi consumption falls by 67% (to 5 bottles).

Coke consumption rose when the price of Pepsi rose, signifying that **they are substitutes.**

The Impact of Changes in Another Good's Price: Substitutes and Complements (3/6)

5.4

A Change in the Price of a Complementary Good

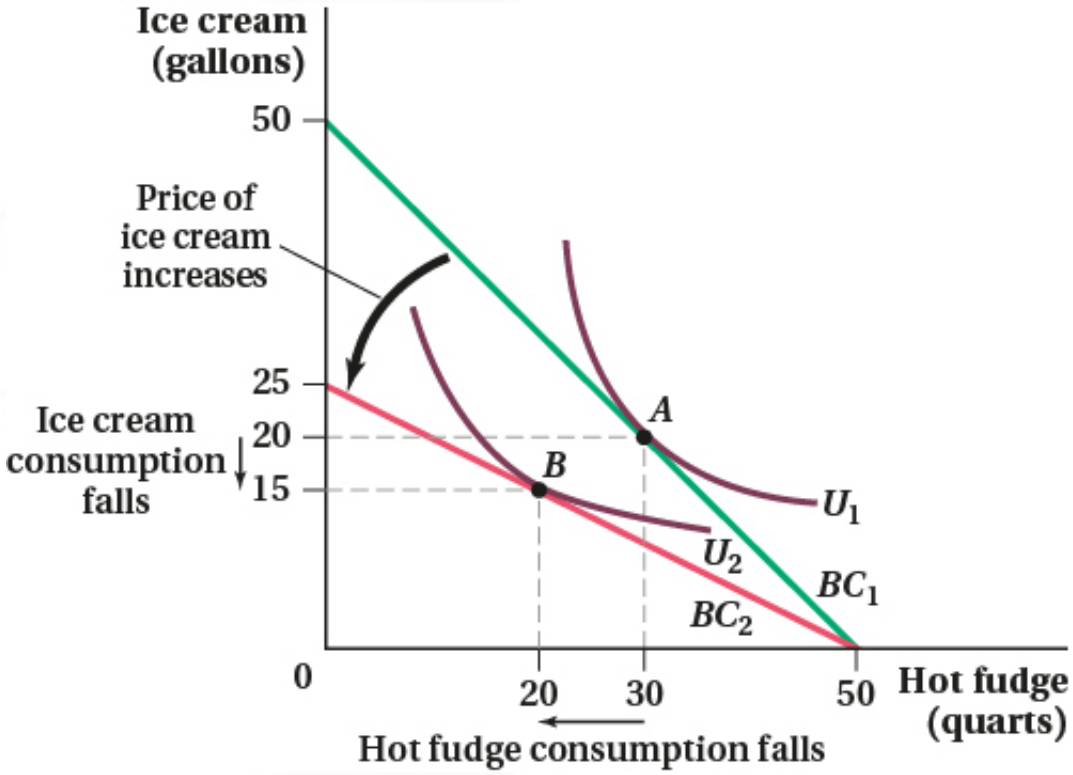
When the price of a **complement** increases, we expect consumption of the primary good to decrease.

- Consider ice cream and hot fudge

The Impact of Changes in Another Good's Price: Substitutes and Complements (4/6)

5.4

Figure 5.14 When the Price of a Complement Rises, Demand Decreases



At original prices, this consumer purchases 20 tubs of ice cream and 30 jars of hot fudge.

When the price of ice cream doubles, consumption of ice cream *falls* by 25% (20 to 15 tubs), and consumption of hot fudge decreases by 33% (30 to 20 jars).

Hot fudge consumption decreased when the price of ice cream increased, signifying that they are **complements.**

The Impact of Changes in Another Good's Price: Substitutes and Complements (5/6)

5.4

A Change in the Price of Substitutes and Complements

When the price of a **substitute** good increases, we expect consumption of the primary good to increase.

- Recall the Pepsi and Coke example

When the price of a **complement** increases, we expect consumption of the primary good to decrease.

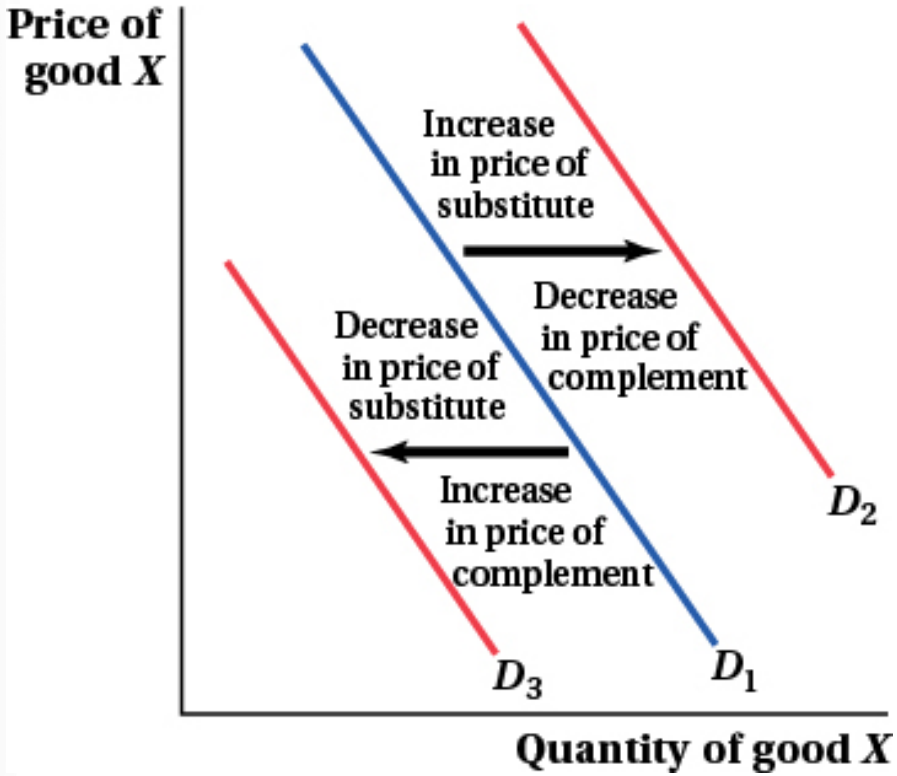
- Recall the ice cream and hot fudge example

These relationships help to explain the shifts in demand examined in Chapter 2.

The Impact of Changes in Another Good's Price: Substitutes and Complements (6/6)

5.4

Figure 5.15 Changes in the Prices of Substitutes or Complements Shift the Demand Curve



Combining Individual Demand Curves to Obtain the Market Demand Curve (1/3)

5.5

The final step linking consumer theory to market demand:

- Market demand is the *horizontal* sum of individual demand curves.
- The market quantity demanded at each price is the sum of the individual quantities demanded at each price.

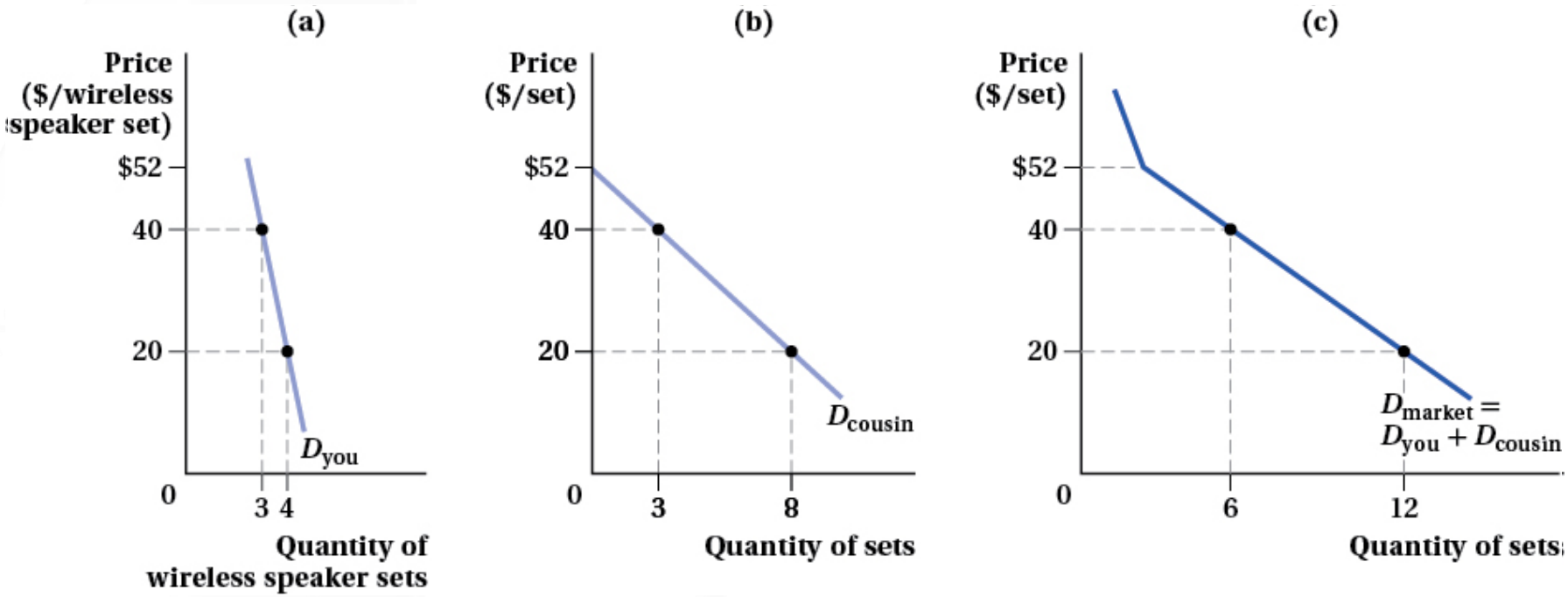
The market demand curve is found by summing horizontally the individual demand curves.

Consider the market for wireless speakers.

Combining Individual Demand Curves to Obtain the Market Demand Curve (2/3)

5.5

Figure 5.17 The Market Demand Curve



Combining Individual Demand Curves to Obtain the Market Demand Curve (3/3)

Mathematically connecting the individual and market demand,

$$Q_{\text{market}} = Q_{\text{you}} + Q_{\text{cousin}} = (5-0.5P) + (13-0.25P)$$

$$Q_{\text{market}} = 18-0.3P$$

The difference in choke prices implies your demand function is the market demand function for prices between \$52 (cousin's choke price) and \$100 (your choke price).

- **The market demand function applies to prices less than \$52.**

$$Q_{\text{market}} = 18-0.3P \qquad \text{for P} < \$52$$

$$Q_{\text{market}} = 5-0.5P \qquad \text{for P} \geq \$52$$

Conclusion (1/1)

5.6

This chapter concludes our in-depth analysis of the consumer side of the supply and demand model. We:

- examined how income and prices affect consumer choices.
- made the link between consumer theory and market demand.

In **Chapter 6,** we begin a parallel in-depth examination of producer behavior.