CHAPTER 21

The Theory of Consumer Choice

PRINCIPLES OF Economics

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In this chapter, look for the answers to these questions:

- How does the budget constraint represent the choices a consumer can afford?
- How do indifference curves represent the consumer's preferences?
- What determines how a consumer divides her resources between two goods?
- How does the theory of consumer choice explain decisions such as how much a consumer saves, or how much labor she supplies?

Introduction

- Recall one of the Ten Principles from Chapter 1: ***People face tradeoffs***.
  - Buying more of one good leaves less income to buy other goods.
  - Working more hours means more income and more consumption, but less leisure time.
  - Reducing saving allows more consumption today but reduces future consumption.
- This chapter explores how consumers make choices like these.

The Budget Constraint: What the Consumer Can Afford

- Example: Hurley divides his income between two goods: fish and mangos.
- A "consumption bundle" is a particular combination of the goods, *e.g.*, 40 fish & 300 mangos.
- **Budget constraint**: the limit on the consumption bundles that a consumer can afford

ACTIVE LEARNING 1

Budget Constraint

Hurley's income: $12,000

Prices: P_F = $40 per fish, P_M = $10 per mango

A. If Hurley spends all his income on fish, how many fish does he buy?

B. If Hurley spends all his income on mangos, how many mangos does he buy?

C. If Hurley buys 100 fish, how many mangos can he buy?

D. Plot each of the bundles from parts **A** – **C** on a graph that measures fish on the horizontal axis and mangos on the vertical, connect the dots.

ACTIVE LEARNING 1

Answers

A. $12000/$40 = 300 fish

B. $12000/$10 = 1200 mangos

C. 100 fish cost $4000, $8000 left buys 800 mangos

D. Hurley's budget constraint shows the bundles he can afford.

The Slope of the Budget Constraint

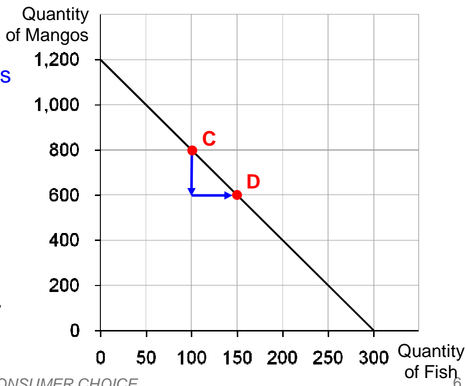
From **C** to **D**,

"rise" = –200 mangos

"run" = +50 fish

Slope = – 4

Hurley must give up 4 mangos to get one fish.



The Slope of the Budget Constraint

The slope of the budget constraint equals

- the rate at which Hurley can trade mangos for fish
- the opportunity cost of fish in terms of mangos
- the relative price of fish:

$$\frac{\text{price of fish}}{\text{price of mangos}} = \frac{\$40}{\$10} = 4 \text{ mangos per fish}$$

ACTIVE LEARNING 2

Budget constraint, *continued.*

Show what happens to Hurley's budget constraint if:

A. His income falls to $8,000.

B. The price of mangos rises to P_M = $20 per mango

ACTIVE LEARNING 2

Answers, part A

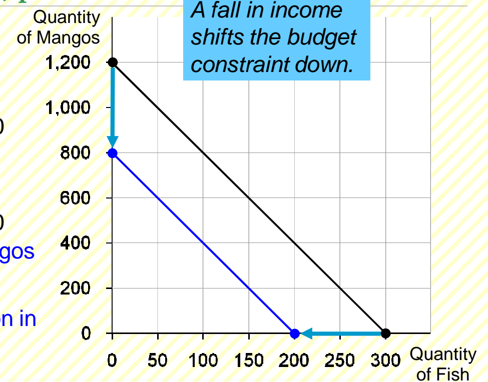
Now, Hurley can buy

$8,000/$40 = 200 fish

or

$8,000/$10 = 800 mangos

or any combination in between.



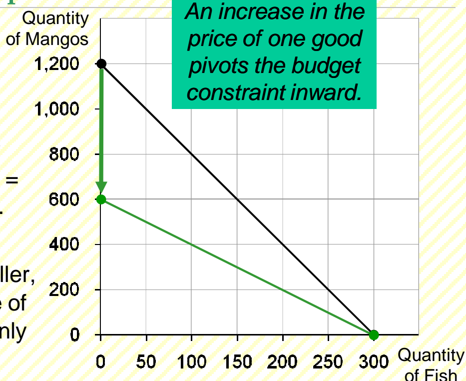
ACTIVE LEARNING 2

Answers, part B

Hurley can still buy 300 fish.

But now he can only buy $12,000/$20 = 600 mangos.

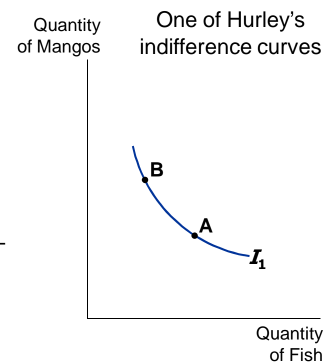
Notice: slope is smaller, relative price of fish is now only 2 mangos.



Preferences: What the Consumer Wants

Indifference curve: shows consumption bundles that give the consumer the same level of satisfaction

A, **B**, and all other bundles on I_1 make Hurley equally happy – he is *indifferent* between them.

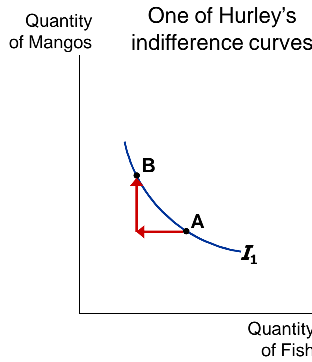


Four Properties of Indifference Curves

1. Indifference curves are downward-sloping.

If the quantity of fish is reduced,

the quantity of mangos must be increased to keep Hurley equally happy.

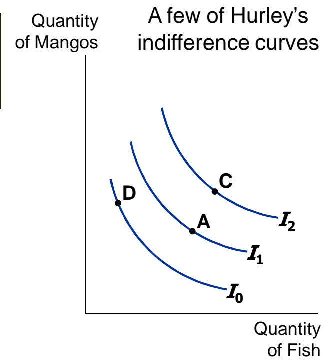


Four Properties of Indifference Curves

2. Higher indifference curves are preferred to lower ones.

Hurley prefers every bundle on I_2 (like **C**) to every bundle on I_1 (like **A**).

He prefers every bundle on I_1 (like **A**) to every bundle on I_0 (like **D**).



Four Properties of Indifference Curves

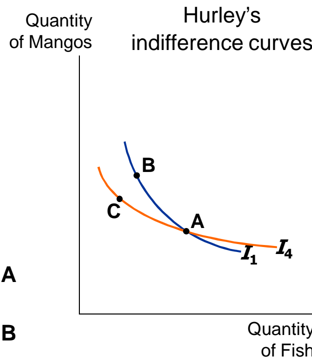
3. Indifference curves cannot cross.

Suppose they did.

Hurley should prefer **B** to **C**, since **B** has more of both goods.

Yet, Hurley is indifferent between **B** and **C**:

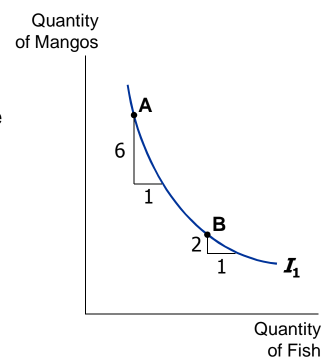
- He likes **C** as much as **A** (both are on I_4).
- He likes **A** as much as **B** (both are on I_1).



Four Properties of Indifference Curves

4. Indifference curves are bowed inward.

Hurley is willing to give up more mangos for a fish if he has few fish (**A**) than if he has many (**B**).

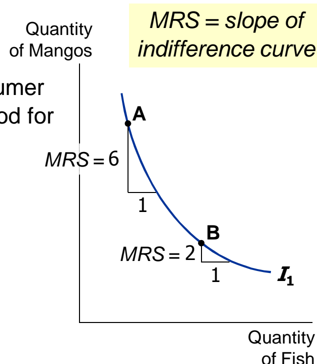


The Marginal Rate of Substitution

Marginal rate of substitution (MRS): the rate at which a consumer is willing to trade one good for another.

Hurley's MRS is the amount of mangos he would substitute for another fish.

MRS falls as you move down along an indifference curve.

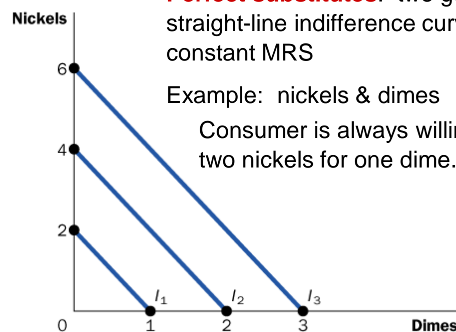


One Extreme Case: Perfect Substitutes

Perfect substitutes: two goods with straight-line indifference curves, constant MRS

Example: nickels & dimes

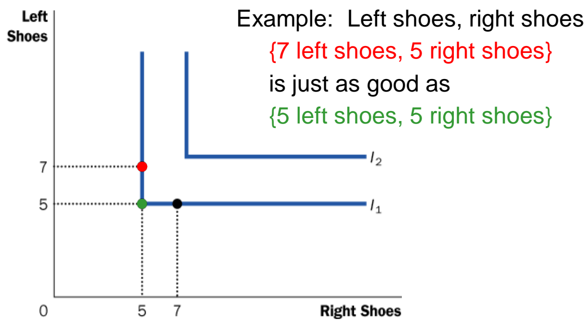
Consumer is always willing to trade two nickels for one dime.



Another Extreme Case: Perfect Complements

Perfect complements: two goods with right-angle indifference curves

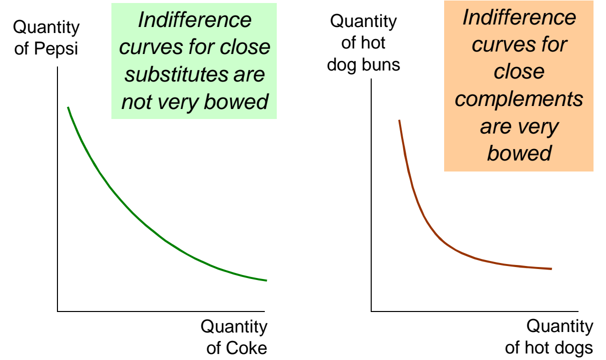
Example: Left shoes, right shoes
{7 left shoes, 5 right shoes}
is just as good as
{5 left shoes, 5 right shoes}



Less Extreme Cases: Close Substitutes and Close Complements

Indifference curves for close substitutes are not very bowed

Indifference curves for close complements are very bowed



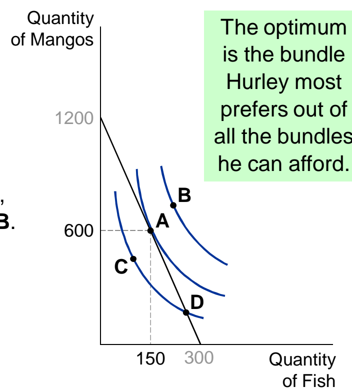
Optimization: What the Consumer Chooses

A is the *optimum*: the point on the budget constraint that touches the highest possible indifference curve.

Hurley prefers **B** to **A**, but he cannot afford **B**.

Hurley can afford **C** and **D**, but **A** is on a higher indifference curve.

The optimum is the bundle Hurley most prefers out of all the bundles he can afford.



Optimization: What the Consumer Chooses

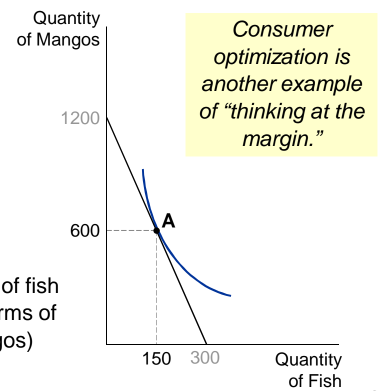
At the optimum, slope of the indifference curve equals slope of the budget constraint:

$MRS = P_F/P_M$

marginal value of fish (in terms of mangos)

price of fish (in terms of mangos)

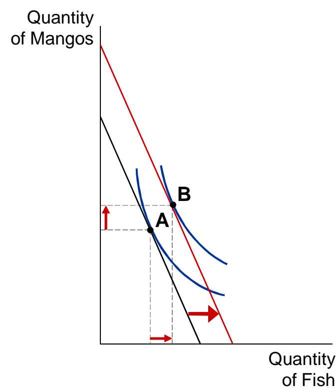
Consumer optimization is another example of "thinking at the margin."



The Effects of an Increase in Income

An increase in income shifts the budget constraint outward.

If both goods are "normal," Hurley buys more of each.



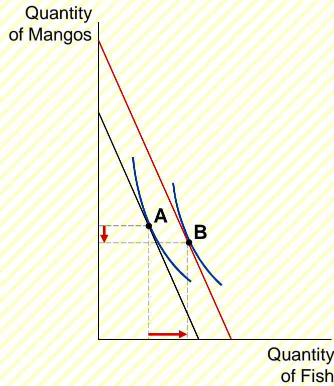
ACTIVE LEARNING *3*

Inferior vs. normal goods

- An increase in income increases the quantity demanded of **normal goods** and reduces the quantity demanded of **inferior goods**.
- Suppose fish is a normal good but mangos are an inferior good.
- Use a diagram to show the effects of an increase in income on Hurley's optimal bundle of fish and mangos.

ACTIVE LEARNING 3
Answers

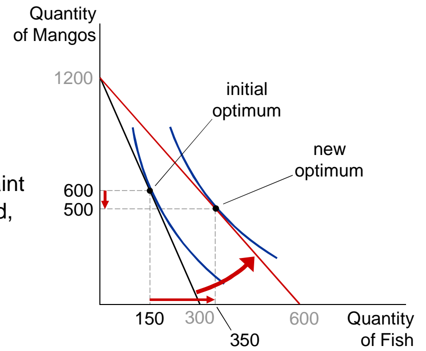
If mangos are inferior, the new optimum will contain fewer mangos.



The Effects of a Price Change

Initially,
P_F = $40
P_M = $10

P_F falls to $20
budget constraint rotates outward,
Hurley buys more fish and fewer mangos.



The Income and Substitution Effects

A fall in the price of fish has two effects on Hurley's optimal consumption of both goods.

- **Income effect**
  A fall in P_F boosts the purchasing power of Hurley's income, allows him to buy more mangos and more fish.
- **Substitution effect**
  A fall in P_F makes mangos more expensive relative to fish, causes Hurley to buy fewer mangos & more fish.

Notice: *The net effect on mangos is ambiguous.*

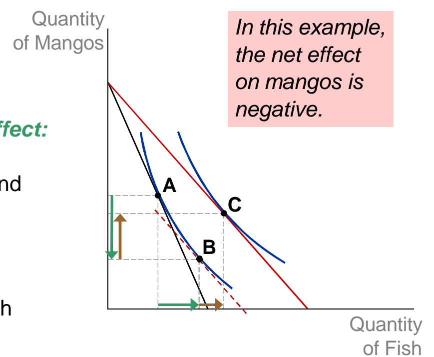
The Income and Substitution Effects

Initial optimum at **A**.

P_F falls.

Substitution effect:
from **A** to **B**,
buy more fish and fewer mangos.

Income effect:
from **B** to **C**,
buy more of both goods.



In this example, the net effect on mangos is negative.

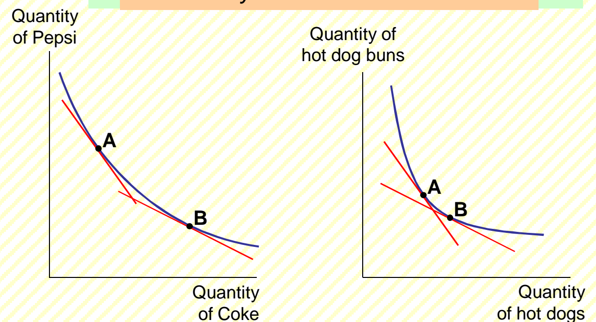
ACTIVE LEARNING 4
The substitution effect in two cases

Do you think the substitution effect would be bigger for substitutes or complements?

- Draw an indifference curve for Coke and Pepsi, and, on a separate graph, one for hot dogs and hot dog buns.
- On each graph, show the effects of a relative price change (keeping the consumer on the initial indifference curve).

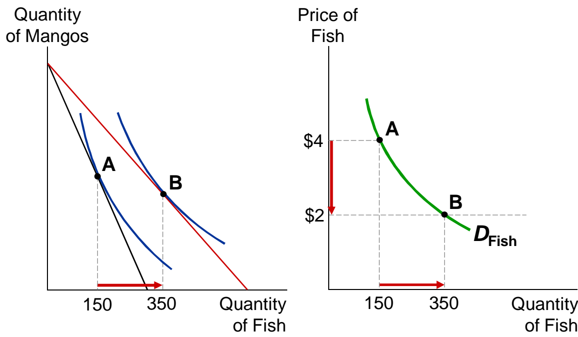
ACTIVE LEARNING 4
Answers

In both graphs, the relative price changes by the same amount.



Deriving Hurley's Demand Curve for Fish

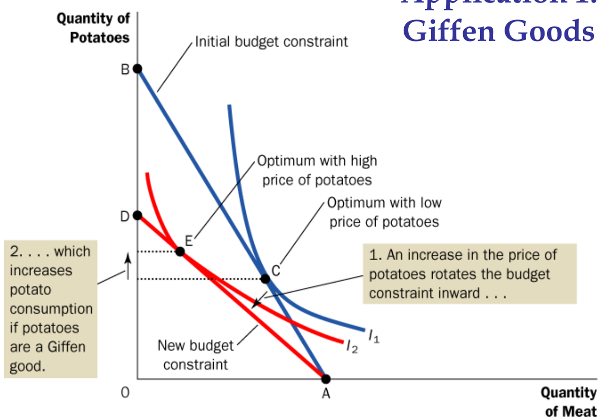
A: When P_F = $4, Hurley demands 150 fish.
B: When P_F = $2, Hurley demands 350 fish.



Application 1: Giffen Goods

- Do all goods obey the *Law of Demand*?
- Suppose the goods are potatoes and meat, and potatoes are an inferior good.
- If price of potatoes rises,
  - substitution effect: buy less potatoes
  - income effect: buy more potatoes
- If income effect > substitution effect, then potatoes are a **Giffen good**, a good for which an increase in price raises the quantity demanded.

Application 1: Giffen Goods



Could This Happen in the Real World???

- Do Giffen goods actually exist?
- Jensen, Robert T., and Nolan H. Miller (2008), "Giffen Behavior and Subsistence Consumption." *American Economic Review*, 98(4): 1553–77.

Freakonomics
THE HIDDEN SIDE OF EVERYTHING

May 5, 2008, 12:07 PM
The Indiana Jones of Economics, Part I
By STEVEN D. LEVITT

A few years back the *Wall Street Journal* dubbed me the **Indiana Jones of economics**.

In reality, that title more rightfully belongs to Robert Jensen, an economist at Brown University who is doing some of the most interesting and adventurous economics studies these days. Jensen has documented how cell phones revolutionized fish markets in India, how simply telling students in the Dominican Republic once about the high value of an additional year of school can impact their choices years later, and how introducing T.V. into rural India affects the position of women.

Robert Jensen

The real reason I call Jensen the Indiana Jones of economics is because of another paper he has written in which he and co-author **Nolan Miller** set out to find one of the elusive Holy Grails of economics: a Giffen good. A Giffen good is one where increasing the price for the exact same good actually leads people to buy *more* of the good. In economic terms, the price elasticity of such a good is positive, rather than

Application 2: Wages and Labor Supply

Budget constraint

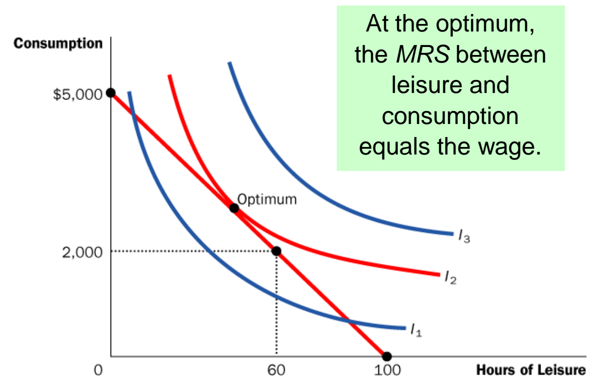
- Shows a person's tradeoff between consumption and leisure.
- Depends on how much time she has to divide between leisure and working.
- The relative price of an hour of leisure is the amount of consumption she could buy with an hour's wages.

Indifference curve

- Shows "bundles" of consumption and leisure that give her the same level of satisfaction.

Application 2: Wages and Labor Supply

At the optimum, the *MRS* between leisure and consumption equals the wage.



Application 2: Wages and Labor Supply

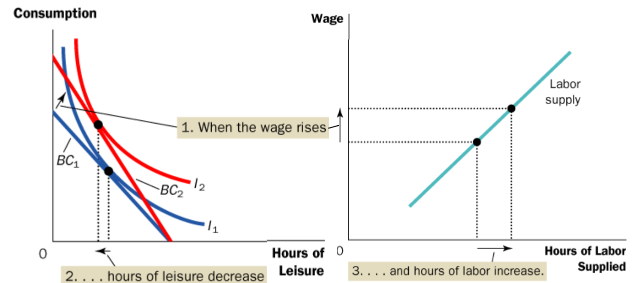
An increase in the wage has two effects
on the optimal quantity of labor supplied.

- *Substitution effect (SE)*: A higher wage makes leisure more expensive relative to consumption.
  The person chooses less leisure,
  i.e., increases quantity of labor supplied.
- *Income effect (IE)*: With a higher wage, she can afford more of both "goods."
  She chooses more leisure,
  i.e., reduces quantity of labor supplied.

Application 2: Wages and Labor Supply

For this person, *SE* > *IE*

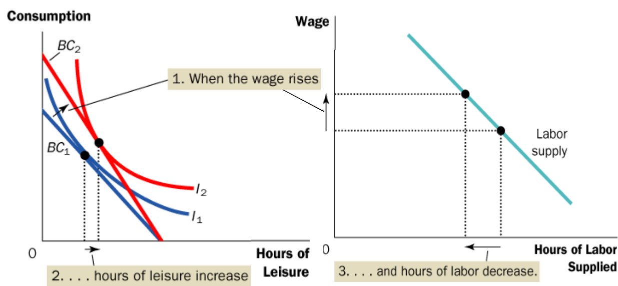
So her labor supply increases with the wage



Application 2: Wages and Labor Supply

For this person, *SE* < *IE*

So his labor supply falls when the wage rises



Could This Happen in the Real World???

Cases where the income effect on labor supply is very strong:

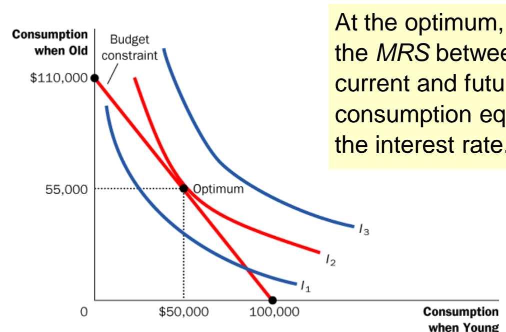
- Over last 100 years, technological progress has increased labor demand and real wages.
  The average workweek fell from 6 to 5 days.
- When a person wins the lottery or receives an inheritance, his wage is unchanged – hence no substitution effect.
  But such persons are more likely to work fewer hours, indicating a strong income effect.

Application 3: Interest Rates and Saving

- A person lives for two periods.
  - Period 1: young, works, earns \$100,000
    consumption = \$100,000 minus amount saved
  - Period 2: old, retired
    consumption = saving from Period 1
    plus interest earned on saving
- The interest rate determines
  the relative price of consumption when young
  in terms of consumption when old.

Application 3: Interest Rates and Saving

Budget constraint shown is for 10% interest rate.



At the optimum, the *MRS* between current and future consumption equals the interest rate.

ACTIVE LEARNING 5
Effects of a change in the interest rate

- Suppose the interest rate rises.
- Describe the income and substitution effects on current and future consumption, and on saving.

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ACTIVE LEARNING 5
Answers

The interest rate rises.

Substitution effect

- Current consumption becomes more expensive relative to future consumption.
- Current consumption falls, saving rises, future consumption rises.

Income effect

- Can afford more consumption in both the present and the future. Saving falls.

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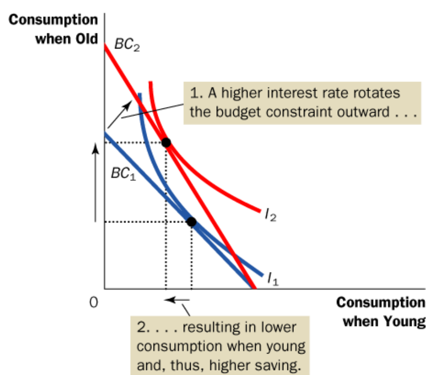
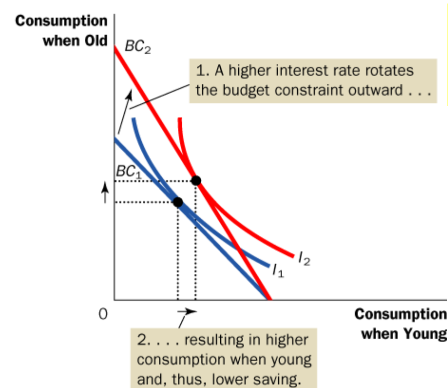
Application 3: Interest Rates and Saving



In this case, *SE* > *IE* and saving rises

Application 3: Interest Rates and Saving



In this case, *SE* < *IE* and saving falls

CONCLUSION:
Do People Really Think This Way?

- People do not make spending decisions by writing down their budget constraints and indifference curves.
- Yet, they try to make the choices that maximize their satisfaction given their limited resources.
- The theory in this chapter is only intended as a metaphor for how consumers make decisions.
- It explains consumer behavior fairly well in many situations and provides the basis for more advanced economic analysis.

CHAPTER SUMMARY

- A consumer's budget constraint shows the possible combinations of different goods she can buy given her income and the prices of the goods. The slope of the budget constraint equals the relative price of the goods.
- An increase in income shifts the budget constraint outward. A change in the price of one of the goods pivots the budget constraint.

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CHAPTER SUMMARY

- A consumer's indifference curves represent her preferences. An indifference curve shows all the bundles that give the consumer a certain level of happiness. The consumer prefers points on higher indifference curves to points on lower ones.
- The slope of an indifference curve at any point is the marginal rate of substitution – the rate at which the consumer is willing to trade one good for the other.

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CHAPTER SUMMARY

- The consumer optimizes by choosing the point on her budget constraint that lies on the highest indifference curve. At this point, the marginal rate of substitution equals the relative price of the two goods.
- When the price of a good falls, the impact on the consumer's choices can be broken down into two effects, an income effect and a substitution effect.

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CHAPTER SUMMARY

- The income effect is the change in consumption that arises because a lower price makes the consumer better off. It is represented by a movement from a lower indifference curve to a higher one.
- The substitution effect is the change that arises because a price change encourages greater consumption of the good that has become relatively cheaper. It is represented by a movement along an indifference curve.

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CHAPTER SUMMARY

- The theory of consumer choice can be applied in many situations. It can explain why demand curves can potentially slope upward, why higher wages could either increase or decrease labor supply, and why higher interest rates could either increase or decrease saving.

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Indifference Curve Analysis

- Budget Constraint
- Indifference Curve
  - MRS
- Optimal Choice at MRS = P_1 / P_2
  - Substitution Effect + Income Effect
- Homework: Mankiw, Ch.21, pp. 480-482, Problem 5, 6, 10, 11, 13.