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## Measuring the Cost of Living

# Measuring the Cost of Living

- Inflation refers to a situation in which the economy's overall price level is rising.
- The inflation rate is the percentage change in the price level from the previous period.

# THE CONSUMER PRICE INDEX

- The *consumer price index (CPI)* is a measure of the overall cost of the goods and services bought by a typical consumer.
- The Bureau of Labor Statistics reports the CPI each month.
- It is used to monitor changes in the cost of living over time.

# THE CONSUMER PRICE INDEX

- When the CPI rises, the typical family has to spend more dollars to maintain the same standard of living.

# How the Consumer Price Index Is Calculated

- ***Fix the Basket:*** Determine what prices are most important to the typical consumer.
  - The Bureau of Labor Statistics (BLS) identifies a market basket of goods and services the typical consumer buys.
  - The BLS conducts monthly consumer surveys to set the weights for the prices of those goods and services.

# How the Consumer Price Index Is Calculated

- ***Find the Prices:*** Find the prices of each of the goods and services in the basket for each point in time.

# How the Consumer Price Index Is Calculated

- ***Compute the Basket's Cost:*** Use the data on prices to calculate the cost of the basket of goods and services at different times.

# How the Consumer Price Index Is Calculated

- ***Choose a Base Year and Compute the Index:***
  - Designate one year as the base year, making it the benchmark against which other years are compared.
  - Compute the index by dividing the price of the basket in one year by the price in the base year and multiplying by 100.



# How the Consumer Price Index Is Calculated

- ***Compute the inflation rate:*** The inflation rate is the percentage change in the price index from the preceding period.

# How the Consumer Price Index Is Calculated

- The Inflation Rate
  - The *inflation rate* is calculated as follows:

$$\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100$$

# Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

## Step 1: Survey Consumers to Determine a Fixed Basket of Goods

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4 hot dogs, 2 hamburgers

# Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

## Step 2: Find the Price of Each Good in Each Year

Year	Price of Hot Dogs	Price of Hamburgers
2001	\$1	\$2
2002	2	3
2003	3	4

# Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

## Step 3: Compute the Cost of the Basket of Goods in Each Year

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2001	$(\$1 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$8$
2002	$(\$2 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$3 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$14$
2003	$(\$3 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$4 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$20$

## Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

**Step 4: Choose One Year as a Base Year (2001) and Compute the Consumer Price Index in Each Year**

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2001	$(\$8/\$8) \times 100 = 100$
2002	$(\$14/\$8) \times 100 = 175$
2003	$(\$20/\$8) \times 100 = 250$

## Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

### Step 5: Use the Consumer Price Index to Compute the Inflation Rate from Previous Year

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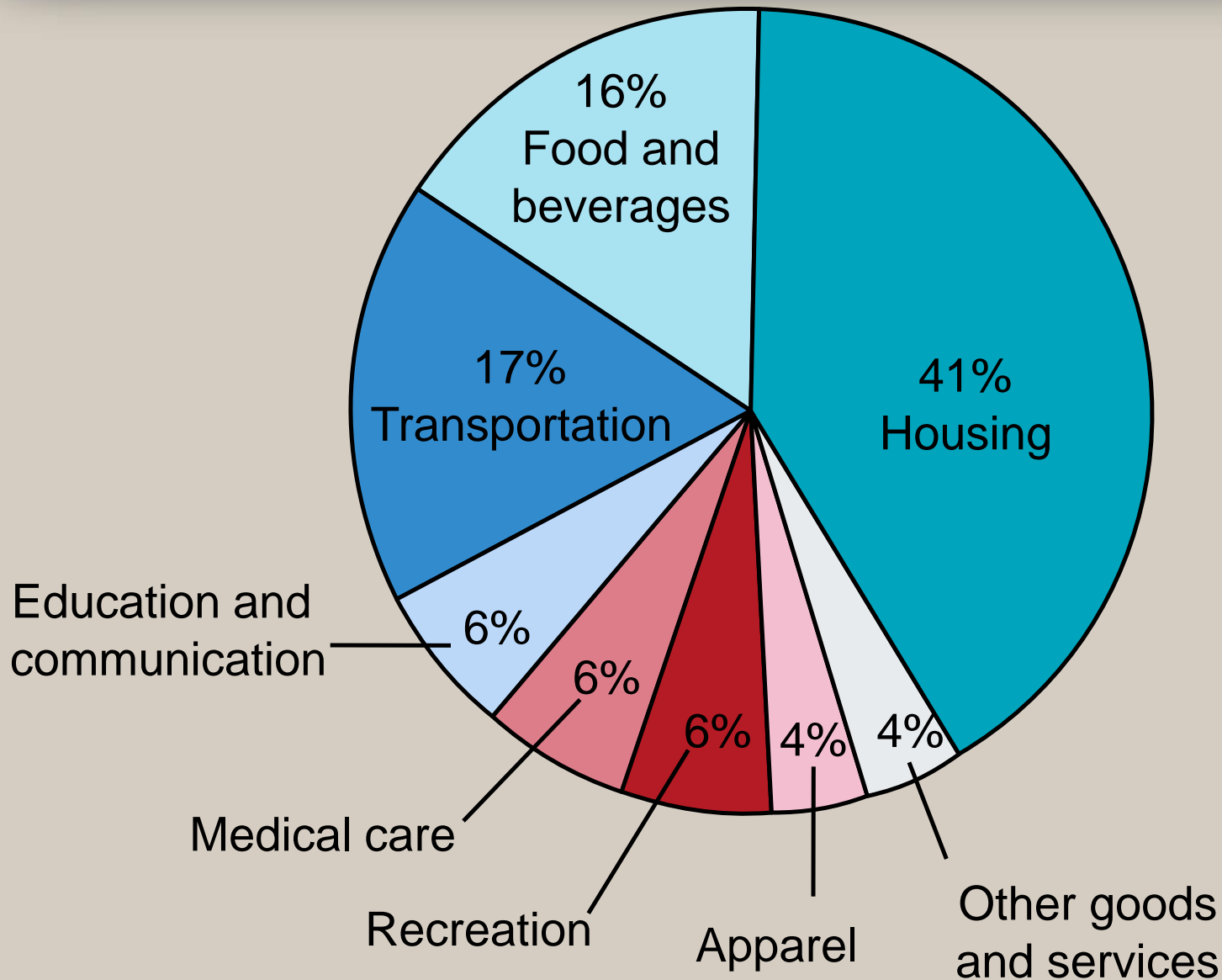
2002	$(175 - 100)/100 \times 100 = 75\%$
2003	$(250 - 175)/175 \times 100 = 43\%$

# How the Consumer Price Index Is Calculated

- Calculating the Consumer Price Index and the Inflation Rate: Another Example
  - Base Year is 2002.
  - Basket of goods in 2002 costs \$1,200.
  - The same basket in 2004 costs \$1,236.
  - $\text{CPI} = (\$1,236 / \$1,200) \times 100 = 103$ .
  - Prices increased 3 percent between 2002 and 2004.



## FYI: What's in the CPI's Basket?



# Problems in Measuring the Cost of Living

- The CPI is an accurate measure of the selected goods that make up the typical bundle, but it is not a perfect measure of the cost of living.

# Problems in Measuring the Cost of Living

- Substitution bias
- Introduction of new goods
- Unmeasured quality changes

# Problems in Measuring the Cost of Living

- Substitution Bias

- The basket does not change to reflect consumer reaction to changes in relative prices.
  - Consumers substitute toward goods that have become relatively less expensive.
  - The index overstates the increase in cost of living by not considering consumer substitution.

# Problems in Measuring the Cost of Living

- Introduction of New Goods
  - The basket does not reflect the change in purchasing power brought on by the introduction of new products.
    - New products result in greater variety, which in turn makes each dollar more valuable.
    - Consumers need fewer dollars to maintain any given standard of living.

# Problems in Measuring the Cost of Living

- Unmeasured Quality Changes
  - If the quality of a good rises from one year to the next, the value of a dollar rises, even if the price of the good stays the same.
  - If the quality of a good falls from one year to the next, the value of a dollar falls, even if the price of the good stays the same.
  - The BLS tries to adjust the price for constant quality, but such differences are hard to measure.

# Problems in Measuring the Cost of Living

- The substitution bias, introduction of new goods, and unmeasured quality changes cause the CPI to overstate the true cost of living.
  - The issue is important because many government programs use the CPI to adjust for changes in the overall level of prices.
  - The CPI overstates inflation by about 1 percentage point per year.

# The GDP Deflator versus the Consumer Price Index

- The GDP deflator is calculated as follows:

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$



# The GDP Deflator versus the Consumer Price Index

- The BLS calculates other prices indexes:
  - The index for different regions within the country.
  - The *producer price index*, which measures the cost of a basket of goods and services bought by firms rather than consumers.

# The GDP Deflator versus the Consumer Price Index

- Economists and policymakers monitor both the GDP deflator and the consumer price index to gauge how quickly prices are rising.
- There are two important differences between the indexes that can cause them to diverge.

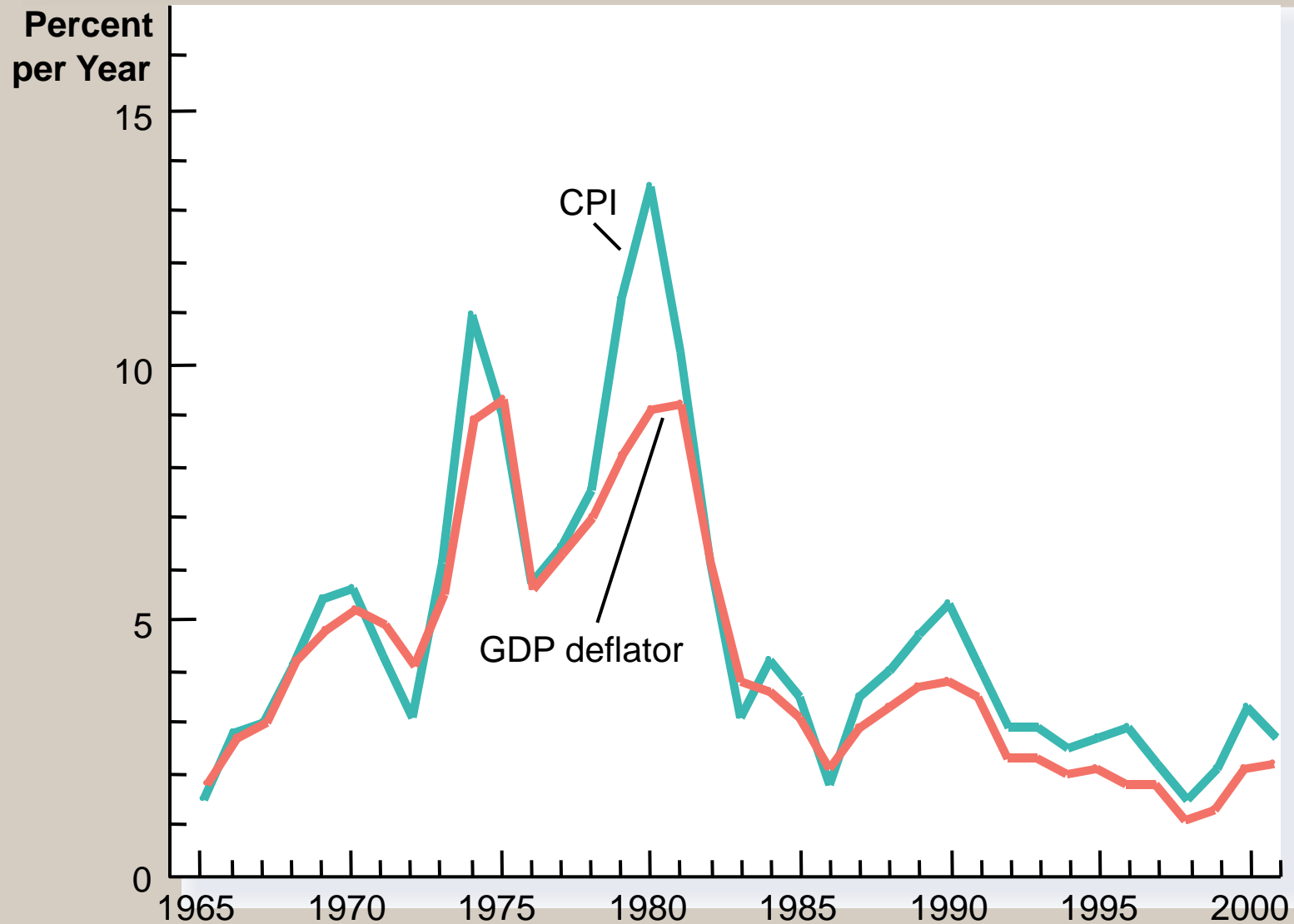
# The GDP Deflator versus the Consumer Price Index

- The *GDP deflator* reflects the prices of all goods and services *produced domestically*, whereas...
- ...the *consumer price index* reflects the prices of all goods and services *bought by consumers*.

# The GDP Deflator versus the Consumer Price Index

- The *consumer price index* compares the price of a *fixed basket* of goods and services to the price of the basket in the base year (only occasionally does the BLS change the basket)...
- ...whereas the *GDP deflator* compares the price of *currently produced* goods and services to the price of the same goods and services in the base year.

## Figure 2 Two Measures of Inflation



# CORRECTING ECONOMIC VARIABLES FOR THE EFFECTS OF INFLATION

- Price indexes are used to correct for the effects of inflation when comparing dollar figures from different times.

# Dollar Figures from Different Times

- Do the following to convert (inflate) Babe Ruth's wages in 1931 to dollars in 2001:

$$\text{Salary}_{2001} = \text{Salary}_{1931} > \frac{\text{Price level in 2001}}{\text{Price level in 1931}}$$

$$= \$80,000 > \frac{177}{15.2}$$

$$= \$931,579$$

## Table 2 The Most Popular Movies of All Times, Inflation Adjusted

Film	Year of Release	Total Domestic Gross (in millions of 2001 dollars)
1. <i>Gone with the Wind</i>	1939	\$1,002
2. <i>Star Wars</i>	1977	866
3. <i>The Sound of Music</i>	1965	695
4. <i>E.T.: The Extra-Terrestrial</i>	1982	687
5. <i>Titanic</i>	1997	640
6. <i>The Ten Commandments</i>	1956	639
7. <i>Jaws</i>	1975	625
8. <i>Doctor Zhivago</i>	1965	591
9. <i>The Jungle Book</i>	1967	519
10. <i>Snow White and the Seven Dwarfs</i>	1937	518



# Indexation

- When some dollar amount is automatically corrected for inflation by law or contract, the amount is said to be *indexed* for inflation.

# Real and Nominal Interest Rates

- Interest represents a payment in the future for a transfer of money in the past.

# Real and Nominal Interest Rates

- The *nominal interest* rate is the interest rate usually reported and not corrected for inflation.
  - It is the interest rate that a bank pays.
- The *real interest rate* is the nominal interest rate that is corrected for the effects of inflation.

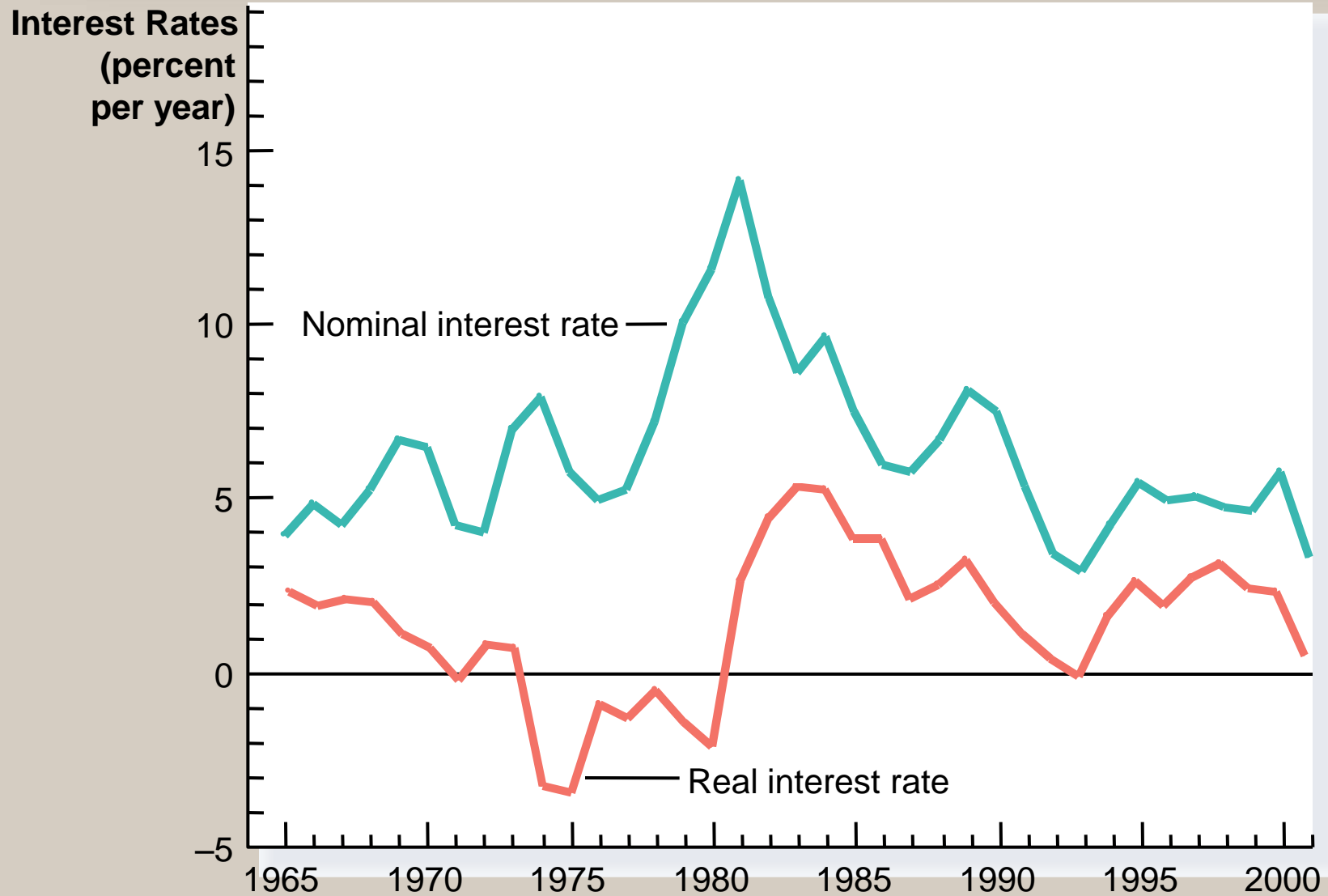
# Real and Nominal Interest Rates

- You borrowed \$1,000 for one year.
- Nominal interest rate was 15%.
- During the year inflation was 10%.

*Real interest rate = Nominal interest rate –  
Inflation*

$$= 15\% - 10\% = 5\%$$

## Figure 3 Real and Nominal Interest Rates



# Summary

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- The consumer price index shows the cost of a basket of goods and services relative to the cost of the same basket in the base year.
- The index is used to measure the overall level of prices in the economy.
- The percentage change in the CPI measures the inflation rate.

# Summary

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- The consumer price index is an imperfect measure of the cost of living for the following three reasons: substitution bias, the introduction of new goods, and unmeasured changes in quality.
- Because of measurement problems, the CPI overstates annual inflation by about 1 percentage point.

# Summary

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- The GDP deflator differs from the CPI because it includes goods and services produced rather than goods and services consumed.
- In addition, the CPI uses a fixed basket of goods, while the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.



# Summary

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- Dollar figures from different points in time do not represent a valid comparison of purchasing power.
- Various laws and private contracts use price indexes to correct for the effects of inflation.
- The real interest rate equals the nominal interest rate minus the rate of inflation.