

# Chapter 2: The Data of Macroeconomics\*

MACROECONOMICS

Seventh Edition

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\*Slides based on Ron Cronovich's slides, adjusted by Marcel Bluhm for lecture in Macroeconomics at the Wang Yanan Institute for Studies in Economics at Xiamen University.

# Learning Objectives and Outline

This chapter introduces you to the meaning and measurement of the most important macroeconomic statistics:

2.1) Gross Domestic Product (GDP) ←

2.2) The Consumer Price Index (CPI)

2.3) The Unemployment Rate

# 2.1) GDP

→ Captures Expenditure and Income

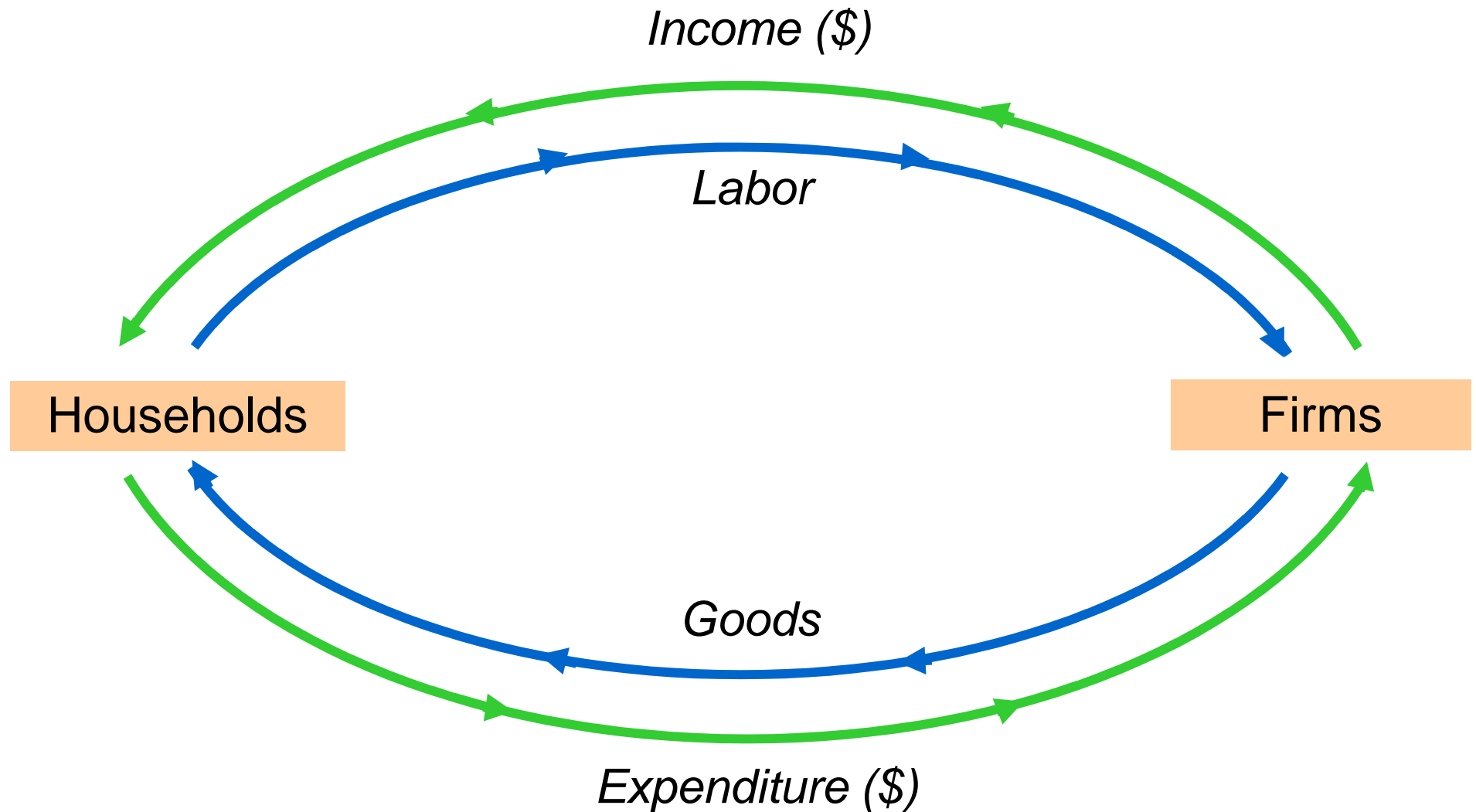
GDP measures the value of economic activity and is defined as

- (i) total expenditure on domestically-produced final goods and services.
- (ii) total income earned by domestically-located factors of production.

Expenditure equals income because every dollar spent by a buyer becomes income to the seller.

# 2.1) GDP

## → The Circular Flow

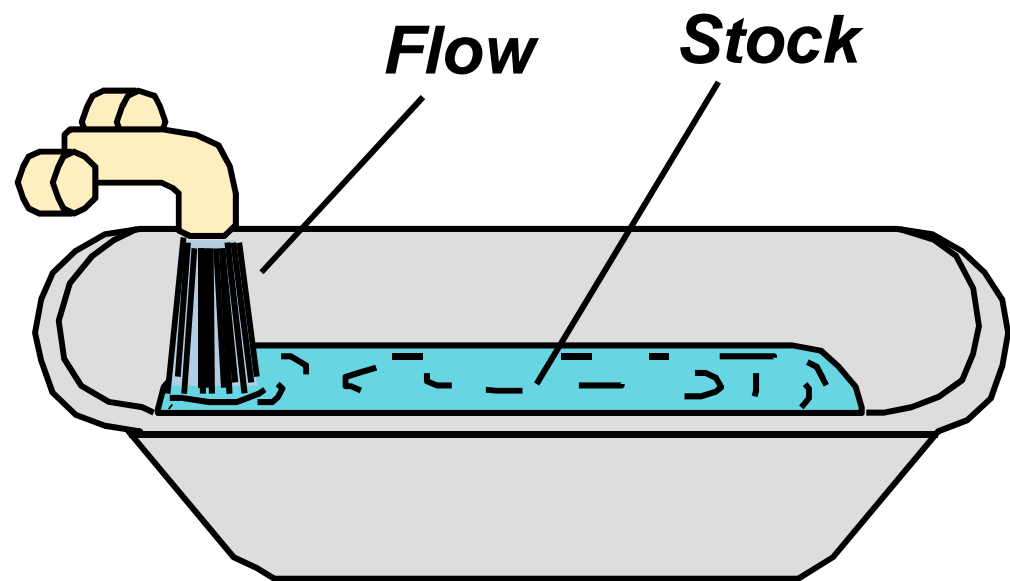


# 2.1) GDP

## → Digression: Stocks vs. Flows:

A **stock** is a quantity measured at a point in time.

For example,  
“The U.S. capital stock was \$26 trillion on January 1, 2009.”



A **flow** is a quantity measured per unit of time.

For example, “U.S. investment was \$2.5 trillion during 2009.”

## 2.1) GDP

### → Rules for Computing GDP

- GDP is the **market value** of all **final** goods and services **produced** within an economy in a given period of time.
- For example, if an economy during 2010 consisted only of apples and oranges, its GDP could be computed as

$$\text{GDP} = \text{Price of Apples} \times \text{Quantity of Apples} + \\ \text{Price of Oranges} \times \text{Quantity of Oranges}$$

## 2.1) GDP

→ Value Added (VA)

A firm's **value added** is the value of its output minus the value of the intermediate goods the firm used to produce that output.

## 2.1) GDP

→ Final Goods, Value Added, GDP

GDP = value of final goods produced  
= sum of value added at all stages of production.

The value of the final goods already includes the value of the intermediate goods, so including intermediate and final goods in GDP would be double-counting.



## 2.1) GDP

→ 该你们了

### Exercise: Compute and Compare VA at Each Stage of Production and GDP

- A farmer grows a bushel of wheat and sells it to a miller for \$1.00.
- The miller turns the wheat into flour and sells it to a baker for \$3.00.
- The baker uses the flour to make a loaf of bread and sells it to an engineer for \$6.00.
- The engineer eats the bread.

# 2.1) GDP

## → Real vs. Nominal GDP

GDP is the value of all final goods and services produced.

**Nominal GDP** measures these values using current prices.

$$\text{NGDP}^{2010} = \text{Price of Apples}^{2010} \times \text{Quantity of Apples}^{2010} + \text{Price of Oranges}^{2010} \times \text{Quantity of Oranges}^{2010}$$

**Real GDP** measure these values using the prices of a base year.

$$\text{RGDP}_{2008}^{2010} = \text{Price of Apples}_{2008} \times \text{Quantity of Apples}^{2010} + \text{Price of Oranges}_{2008} \times \text{Quantity of Oranges}^{2010}$$

## 2.1) GDP

### → Real GDP Controls for Inflation

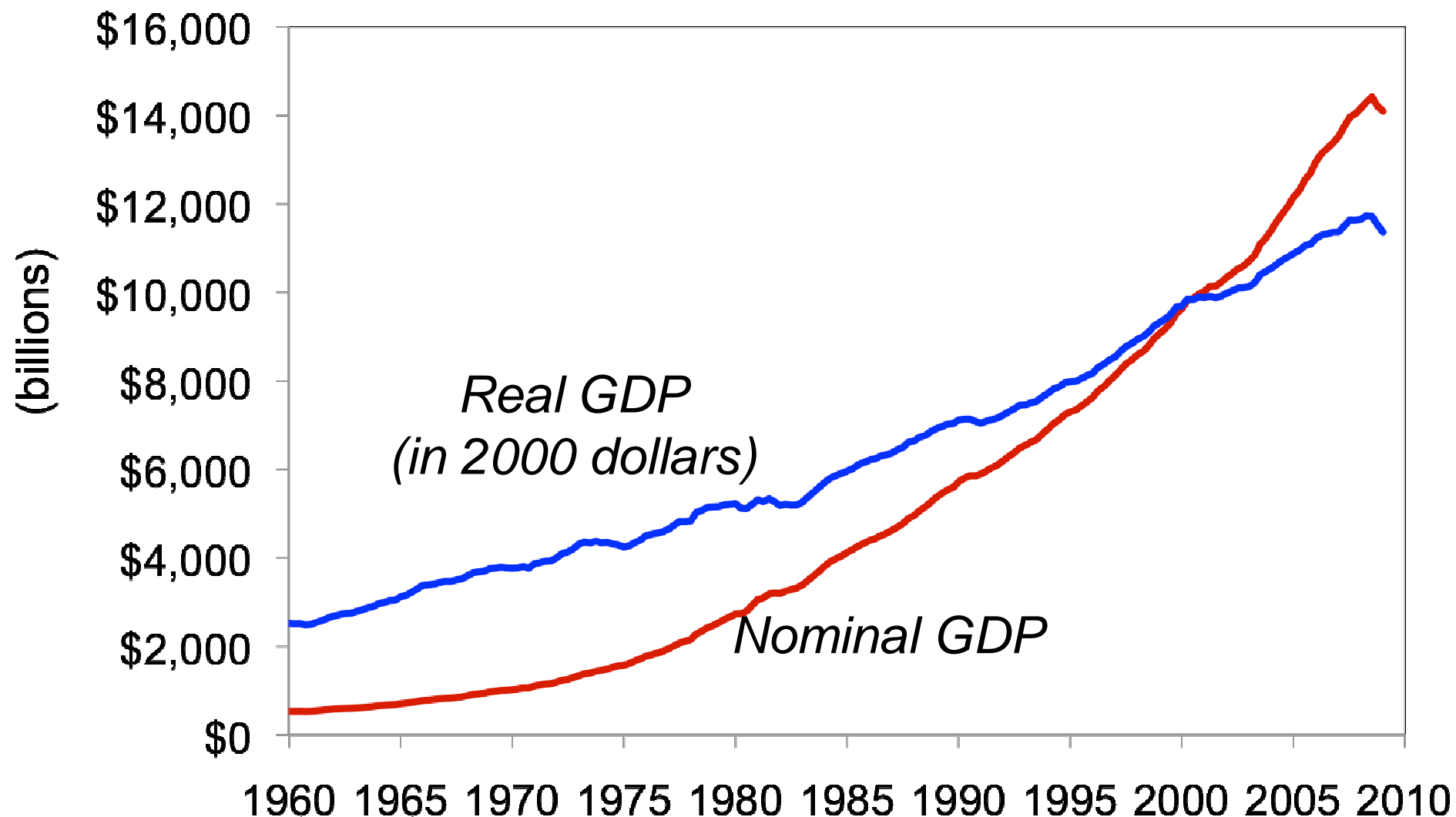
Changes in nominal GDP can be due to:

- changes in prices.
- changes in quantities of output produced.

Changes in real GDP can only be due to changes in quantities, because real GDP is constructed using constant base-year prices.

# 2.1) GDP

→ U.S. Nominal and Real GDP, 1960 - 2009



# 2.1) GDP

## → GDP Deflator

- The **inflation rate** is the percentage increase in the overall level of prices.
- One measure of the price level is the **GDP deflator**, defined as:

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

## 2.1) GDP

### → Chain-Weighted Real GDP

Over time, relative prices change, so the base year should be updated periodically.

In essence, **chain-weighted real GDP** updates the base year every year (using average prices over the period under consideration), so it is more accurate than constant-price GDP.

Your textbook usually uses constant-price real GDP, because:

- the two measures are highly correlated
- constant-price real GDP is easier to compute

## 2.1) GDP

→ 该你们了

	2006		2007		2008	
	P	Q	P	Q	P	Q
good A	\$30.00	900	\$31.00	1000	\$36.00	1050
good B	\$100.00	192	\$102.00	200	\$100.00	205

Compute nominal GDP in each year.

Compute real GDP in each year using 2006 as the base year.

# 2.1) GDP

## → Expenditure Components of GDP

National income accounts divide GDP into four broad categories of spending:

- Consumption (**C**)
- Investment (**I**)
- Government spending (**G**)
- Net exports (**NX**)

National income accounts identity: Output=Expenditure

$$**GDP = Y = C + I + G + NX**$$



## 2.1) GDP

→ Expenditure Components of GDP: **C**

$$Y = C + I + G + NX$$

Definition: The value of all goods and services bought by households.

Includes:

- **Durable goods**  
last a long time, ex: cars, home appliances
- **Nondurable goods**  
last a short time, ex: food, clothing
- **Services**  
work done for consumers, ex: dry cleaning, air travel.

## 2.1) GDP

→ Expenditure Components of GDP: **C**

### U.S. consumption, 2009

	<i>\$ billions</i>	<i>% of GDP</i>
Consumption	\$ 10,001	70.8%
- Durables	1,027	7.3
- Nondurables	2,204	15.6
- Services	6,771	48.0

## 2.1) GDP

→ Expenditure Components of GDP: I

$$Y = C + I + G + NX$$

Definition: spending on goods bought for future use.

Includes:

- **Business fixed investment**  
Spending on plant and equipment that firms will use to produce other goods & services.
- **Residential fixed investment**  
Spending on housing units by consumers and landlords.
- **Inventory investment**  
The change in the value of all firms' inventories.

## 2.1) GDP

### → Expenditure Components of GDP: I

Total U.S. investment in 2009:

	<i>\$ billions</i>	<i>% of GDP</i>
Investment	\$1,589	11.3%
- Business fixed	1,364	9.7
- Residential	352	2.5
- Inventory	-127	-0.9

## 2.1) GDP

→ Expenditure Components of GDP: **G**

$$Y = C + I + G + NX$$

Definition: spending on goods and services bought by federal state and local governments.

### Includes:

- **Diverse items**

Military equipment, highways, services provided by government workers etc.

### Excludes:

- **Transfer payments**

(e.g., unemployment insurance payments), because they do not represent spending on goods and services.

## 2.1) GDP

### → Expenditure Components of GDP: **G**

#### U.S. Government Spending, 2009

	\$ billions	% of GDP
Govt spending	\$2,915	20.6%
- Federal	1,140	8.1
Non-defense	368	2.6
Defense	772	5.5
- State & local	1,775	12.6

## 2.1) GDP

→ Expenditure Components of GDP: **NX**

$$Y = C + I + G + \mathbf{NX}$$

Definition:  **$NX = EX - IM$**

where:

- **NX** are net exports
- **EX** are total exports
- **IM** are total imports

# 2.1) GDP

## → Expenditure Components of GDP: **NX**

### U.S. Net Exports, 2009

	\$ billions	% of GDP
Net exports of g & s	-\$386	-2.7%
- Exports	1,578	11.2%
Goods	1,063	7.5%
Services	515	3.6%
- Imports	1,965	13.9%
Goods	1,588	11.2%
Services	377	2.7%



# 2.1) GDP

→ An Important and Versatile Concept

We have now seen that GDP measures

- Total expenditure
- Total output
- Total income
- The sum of value-added at all stages in the production of final goods

# 2.1) GDP

## → Other Measures of Income

- GDP is the total income earned by domestically-located factors of production
- Gross National Product (GNP) is the total income earned by the nation's factors of production:  
$$\text{GNP} = \text{GDP} + \text{fact. paym. from abroad} - \text{fact. paym. to abroad}$$

Examples of factor payments: wages, profits, rent, interest etc.

- Net National Product (NNP)  
$$\text{NNP} = \text{GNP} - \text{Depreciation}$$

# 2.1) GDP

→ → 该你们了

Country	Subject Descriptor	Subject Notes	2008	2009	2010
U.S.	GDP, constant prices	Billions (2005)	\$ 13228,85	12880,60	13245,58
U.S.	GDP, current prices	Billions \$	14369,08	14119,05	14657,80
U.S.	GDP Deflator	Index			
U.S.	Inflation (year-on-year)	Percent	n.a.		

Compute the GDP deflator in each year.

Use GDP deflator to compute the inflation rate from 2008 to 2009, and from 2009 to 2010.

# Learning Objectives

This chapter introduces you to the meaning and measurement of the most important macroeconomic statistics:

- Gross Domestic Product (GDP) ✓
- The Consumer Price Index (CPI) ←
- The Unemployment Rate

# 2.2) CPI

## → Overview

- A measure of the overall level of prices
- In the U.S. Published by the Bureau of Labor Statistics (BLS)
- Uses:
  - tracks changes in the typical household's cost of living
  - adjusts many contracts for inflation
  - allows comparisons of dollar amounts over time

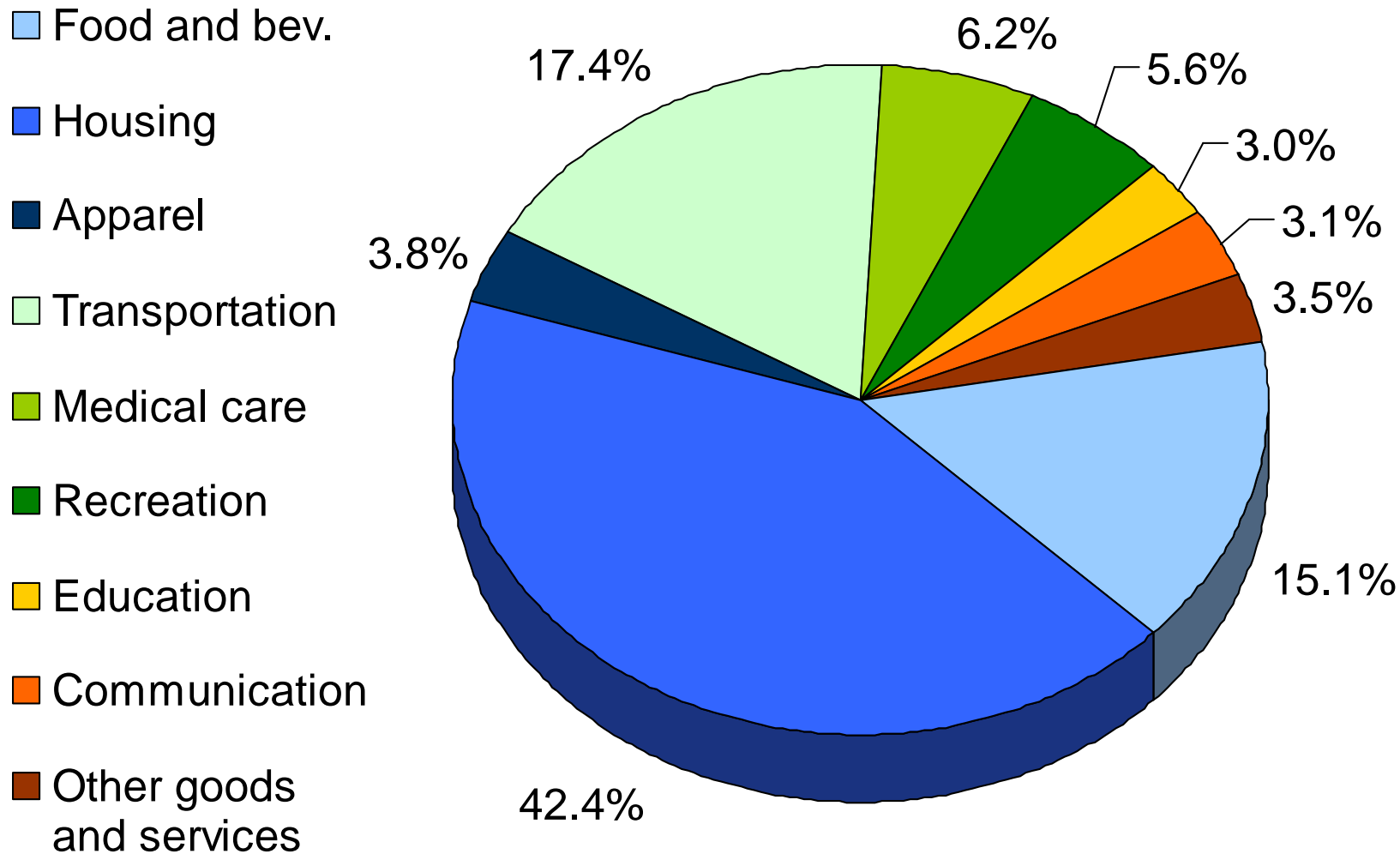
## 2.2) CPI

### → How the BLS Constructs the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods.
2. Every month, collect data on prices of all items in the basket; compute cost of basket
3. CPI in any month equals

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

# The Composition of the CPI's "basket"



## 2.2) CPI

### → CPI vs. GDP Deflator

#### Prices of capital goods

- included in GDP deflator (if produced domestically)
- excluded from CPI

#### Prices of imported consumer goods

- included in CPI
- excluded from GDP deflator

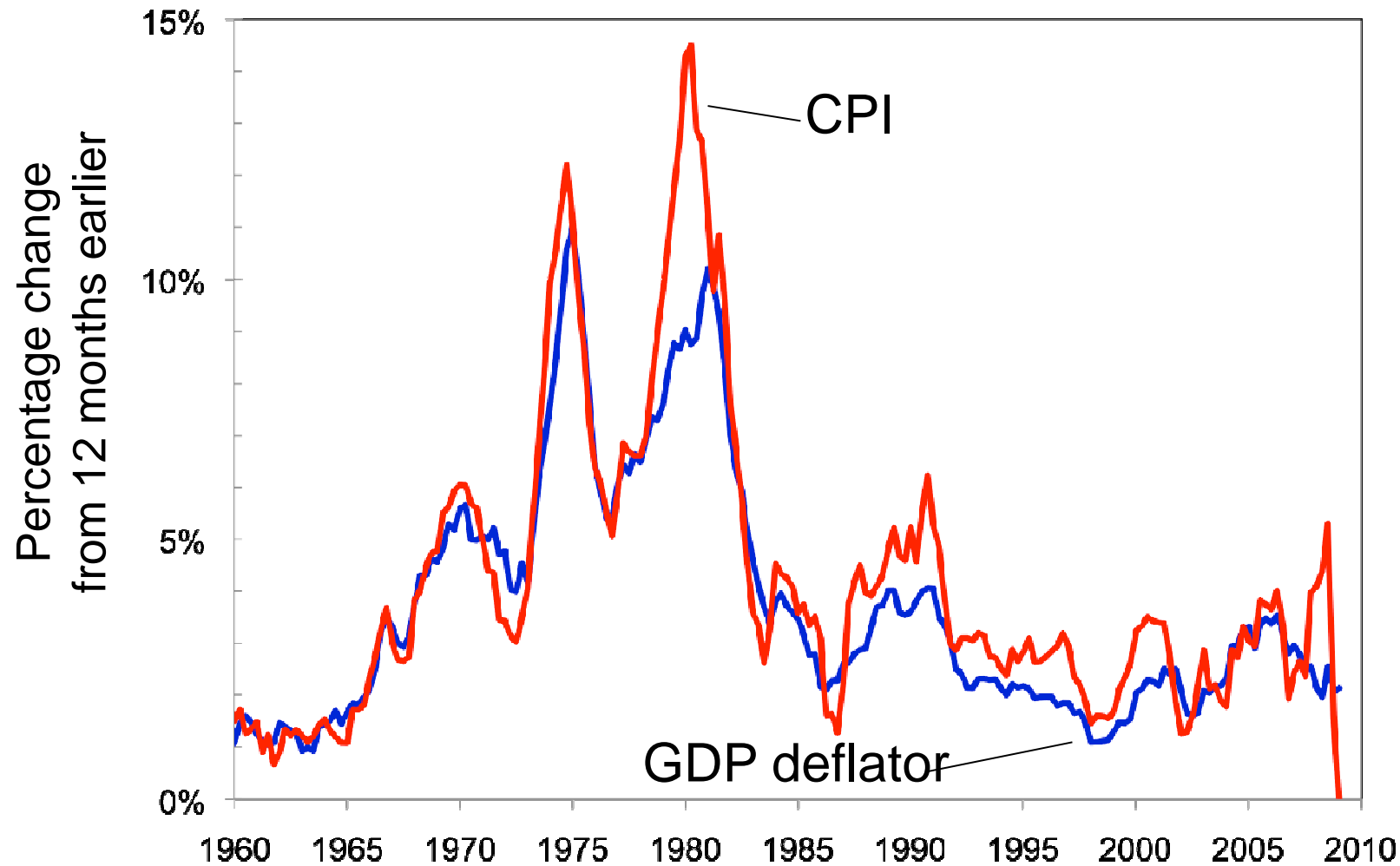
#### The basket of goods

- CPI: fixed
- GDP deflator: changes every year



## 2.2) CPI

→ Two Measures for Inflation in the U.S.



## 2.2) CPI

→ 该你们了: Compute the CPI

Basket contains 20 pizzas and 10 compact discs.

Prices:

	Pizza	CDs
2002	\$10	\$15
2003	\$11	\$15
2004	\$12	\$16
2005	\$13	\$15

For each year, compute

- the cost of the basket
- the CPI (with base-year 2002)
- the inflation rate from the preceding year

# Learning Objectives

This chapter introduces you to the meaning and measurement of the most important macroeconomic statistics:

- Gross Domestic Product (GDP) ✓
- The Consumer Price Index (CPI) ✓
- The Unemployment Rate ←

## 2.3) The Unemployment Rate

### → Categories of the Population

- **Employed:** working at a paid job
- **Unemployed:** not employed but looking for a job
- **Labor force:** the amount of labor available for producing goods and services; all employed plus unemployed persons
- **Not in the labor force:** not employed, not looking for work

## 2.3) The Unemployment Rate

→ Two Important Labor Force Concepts

- **Unemployment rate:** percentage of the labor force that is unemployed
- **Labor force participation rate:** the fraction of the adult population that “participates” in the labor force

## 2.3) The Unemployment Rate

→ 该你们了: Computing Labor Force Statistics

### U.S. adult population by group, Oct 2010

Number employed = 139.1 million

Number unemployed = 14.8 million

Adult population = 238.5 million

Use the above data to calculate

- the labor force
- the number of people not in the labor force
- the labor force participation rate
- the unemployment rate

# Chapter Summary

1. Gross Domestic Product (GDP) measures both total income and total expenditure on the economy's output of goods & services.
2. Nominal GDP values output at current prices; real GDP values output at constant prices. Changes in output affect both measures, but changes in prices only affect nominal GDP.
3. GDP is the sum of consumption, investment, government purchases, and net exports.

# Chapter Summary (ctd.)

4. The overall level of prices can be measured by either
  - the Consumer Price Index (CPI), the price of a fixed basket of goods purchased by the typical consumer, or
  - the GDP deflator, the ratio of nominal to real GDP
5. The unemployment rate is the fraction of the labor force that is not employed.