



CHAPTER 4

The Data of Macroeconomics



Macroeconomics Sixth Edition
N. George Mankiw

Second semester



In this chapter, you will learn...

...the meaning and measurement of the most important macroeconomic statistics:

- Gross Domestic Product (GDP)
- The Consumer Price Index (CPI)
- The unemployment rate



Introduction

As you may recall from Chapter 2, economics is divided into two branches: **microeconomics** and **macroeconomics**.

Microeconomics is the study of how individual households and firms make decisions and how they interact with one another in markets.

Macroeconomics is the study of the economy as a whole. Macroeconomists address diverse questions:

Why is average income high in some countries while it is low in others?

Why do prices sometimes rise rapidly while at other times they are more stable?

Why do production and employment expand in some years and contract in others?

What, if anything, can the government do to promote rapid growth in incomes, low inflation, and stable employment?



What is gross domestic product?

- GDP is the market value of all finished goods and services. A finished good or service is one that will not be sold again as part of some other good.

*There are **intermediate goods and services** will not be counted in the GDP, because they are not finished goods , they will be sold it again as part of the other goods.*

There are also goods, these are called **capital goods**, that are used to make other goods, but are still considered finished goods.



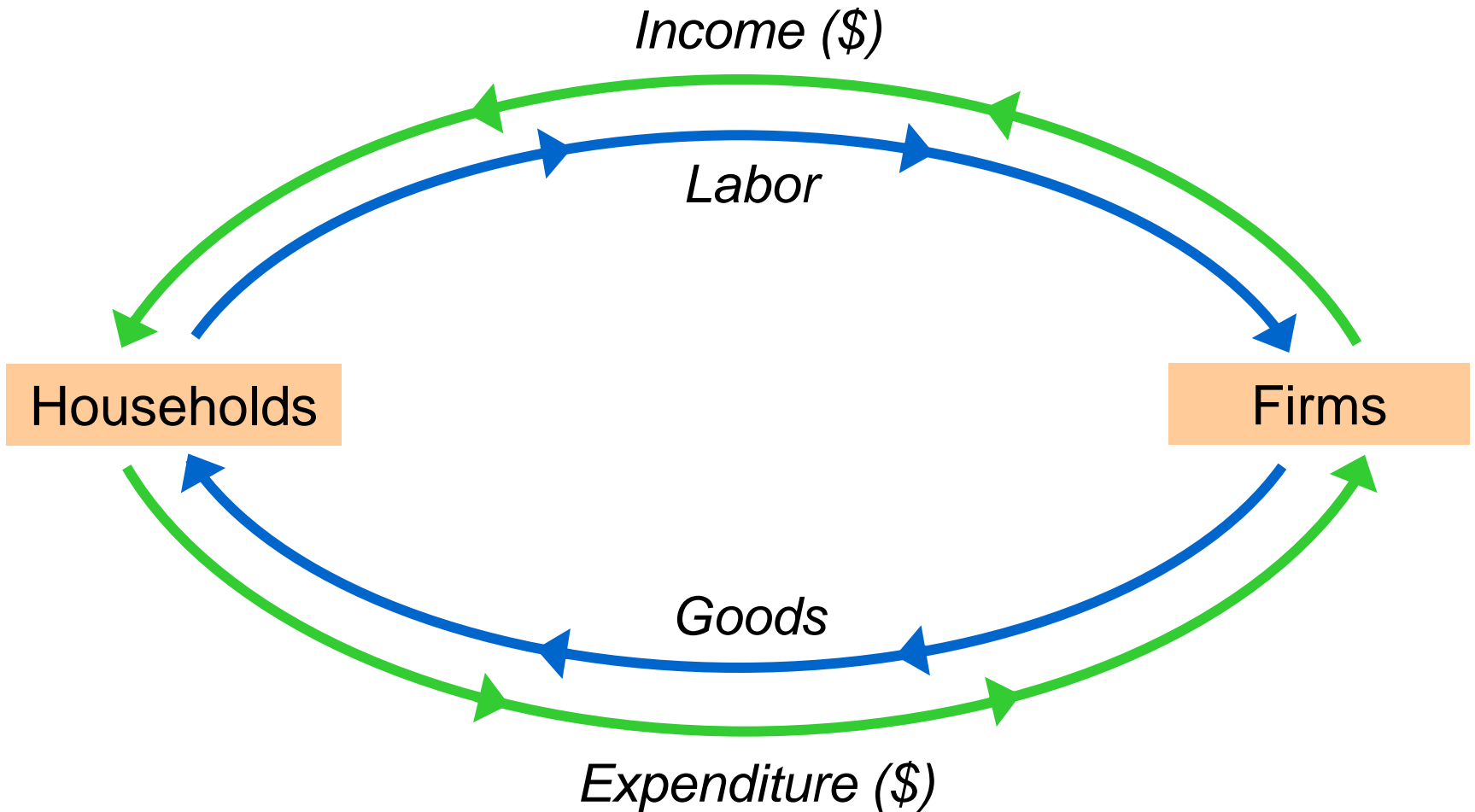
Gross Domestic Product: Expenditure and Income

Two definitions:

- Total expenditure on domestically-produced final goods and services.
- Total income earned by domestically-located factors of production.
- This means GDP measures two things at once: the total income of everyone in the economy and the total expenditure on the economy's output of goods and services.

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

The Circular Flow





Value added

definition:

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.



Exercise: (Problem 2, p. 40)

- 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.

*Compute & compare
value added at each stage of production
and GDP*



Lessons of this problem:

- **GDP = value of final goods = sum of value at all stages of production**
- **We don't include the value of intermediate goods in GDP because their value is already included in the value of the final goods.**

Answer:

Each person's value-added (VA) equals the value of what he/she produced minus the value of the intermediate inputs he/she started with.

Farmer's VA = \$1

Miller's VA = \$3

Baker's VA = \$2

GDP = \$6

Note that GDP = value of final good = sum of value-added at all stages of production.

Even though this problem is highly simplified, its main lesson holds in the real world: the value of all final goods produced equals the sum of value-added in all stages of production of all goods.



Final goods, value added, and GDP

- GDP is the market value of all finished goods and services.
- A finished good or service is one that will not be sold again as part of some other good.
- 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
- (GDP includes both tangible goods (food, clothing, cars) and intangible services (haircuts, housecleaning, doctor visits).
- so including intermediate and final goods in GDP would be double-counting.



The expenditure components of GDP

- consumption
- investment
- government spending
- net exports



Consumption (C)

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



- ***durable goods***
 - that do not have to be purchased frequently because they are made to last for an extended period of time (typically more than three years)
 - 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.



U.S. consumption, 2005

	<i>\$ billions</i>	<i>% of GDP</i>
Consumption	\$8,745.7	70.0%
Durables	1,026.5	8.2
Nondurables	2,564.4	20.5
Services	5,154.9	41.3



Investment (I)

Definition 1: Spending on [the factor of production] capital.

Definition 2: 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***

- What is produced in a certain country is naturally also sold eventually, but some of the goods produced in a given year may be sold in a later year rather than in the year they were produced.

The change in the value of all firms' inventories. slide 13



Investment

- Note that aggregate investment equals total spending on newly produced capital goods. (If I pay \$1000 for a used computer for my business, then I'm doing \$1000 of investment, but the person who sold it to me is doing \$1000 of disinvestment, so there is no net impact on aggregate investment.)
- The housing issue
- A consumer's spending **on a new house** counts under investment, not consumption.
- A tenant's spending **on rent** counts under services -- rent is considered spending on "housing services."
- So what happens if a renter buys the house she had been renting? Conceptually, consumption should remain unchanged: just because she is no longer paying rent, she is still consuming the same housing services as before.



Inventories

- If total inventories are \$10 billion at the beginning of the year, and \$12 billion at the end, then inventory investment equals \$2 billion for the year.
- Note that inventory investment can be negative (which means inventories fell over the year).



U.S. investment, 2005

	<i>\$ billions</i>	<i>% of GDP</i>
Investment	\$2,105.0	16.9%
Business fixed	1,329.8	10.6
Residential	756.3	6.1
Inventory	18.9	0.2



Investment vs. Capital

Note: Investment is spending on new capital.

Example (*assumes no depreciation*):

- 1/1/2006:
economy has \$500b worth of capital
- during 2006:
investment = \$60b
- 1/1/2007:
economy will have \$560b worth of capital



Depreciation

- If we study the stocks vs. flows concepts, this is a good example of the difference.
- Net national product (NNp) is the total income of a nation's residents (GNp) minus losses from depreciation.
- Depreciation is the wear and tear on the economy's stock of equipment and structures, such as trucks rusting and old computer models becoming outdated.
- Thus, depreciation is called the "consumption of fixed capital"



Stocks vs. Flows

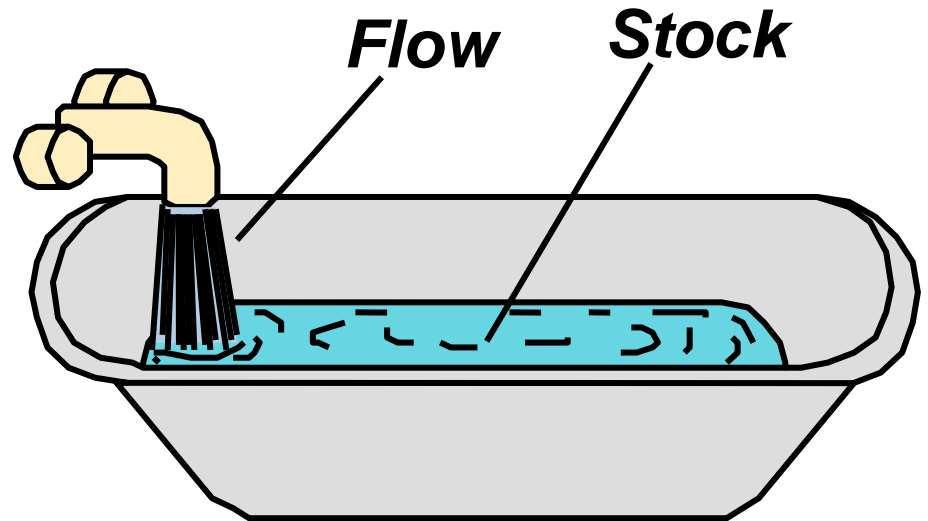
A **stock** is a quantity measured **at a point in time.**

E.g.,

“The U.S. capital stock was \$26 trillion on January 1, 2006.”

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

E.g., “U.S. investment was \$2.5 trillion during 2006.”





Stocks vs. Flows - examples

<i>stock</i>	<i>flow</i>
a person's wealth	a person's annual saving
# of people with college degrees	# of new college graduates this year
the govt debt	the govt budget deficit



Now you try:

Stock or flow?

- the balance on your credit card statement
- how much you study economics outside of class
- the size of your compact disc collection
- the inflation rate
- the unemployment rate



The answers, and explanations:

- The balance on your credit card statement is a stock. (A corresponding flow would be the amount of new purchases on your credit card statement.)
 - How much you study is a flow. The statement “I study 10 hours” is only meaningful if we know the time period – whether 10 years per day, per week, per month, etc.
 - The size of your compact disc collection is a stock. (A corresponding flow would be how many CDs you buy per month.)
 - The inflation rate is a flow: we say “prices are increasing by 3.2% per year” or “by 0.4% per month”.
 - The unemployment rate is a stock: It’s the number of unemployed people divided by the number of people in the workforce. In contrast, the number of newly unemployed people per month would be a flow.
-
- Note: Students have not yet seen official definitions of the inflation and unemployment rates. However, it is likely they are familiar with these terms, either from their introductory economics course or from reading the newspaper.
 - Note: The stocks vs. flows concept is not mentioned very much in the subsequent chapters. If you do not want your students to forget it, then a good idea would be to do the following: As subsequent chapters introduce new variables, ask students whether each new variable is a stock or a flow.



Government spending (G)

- **G** includes all government spending on goods and services..
- **G** excludes transfer payments (e.g., unemployment insurance payments), because they do not represent spending on goods and services.



U.S. government spending, 2005

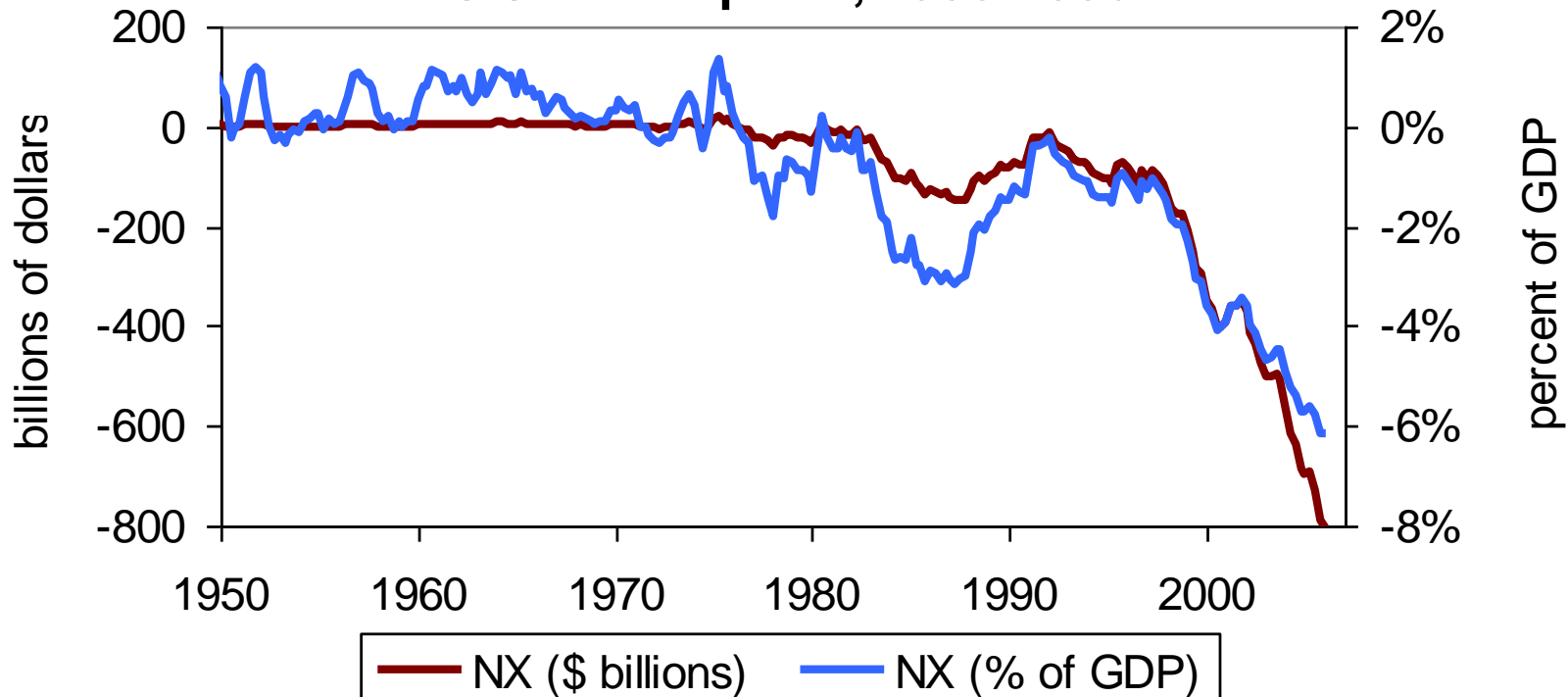
	\$ billions	% of GDP
Govt spending	\$2,362.9	18.9%
Federal	877.7	7.0
Non-defense	290.6	2.3
Defense	587.1	4.7
State & local	1,485.2	11.9



Net exports: $NX = EX - IM$

def: The value of total exports (**EX**)
minus the value of total imports (**IM**).

U.S. Net Exports, 1950-2006





Net export

- Remember, GDP is the value of spending on our country's output of goods & services.
- Exports represent foreign spending on our country's output, so we include exports.
- Imports represent the portion of domestic spending (C, I, and G) that goes to foreign goods and services, so we subtract off imports.
- NX, therefore, equals net spending by the foreign sector on domestically produced goods & services.



An important identity

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

value of total output

aggregate expenditure



A question for you:

Suppose a firm

- produces \$10 million worth of final goods
- but only sells \$9 million worth.

Does this violate the
expenditure = output identity?



Why output = expenditure

- Unsold output goes into inventory, and is counted as “inventory investment”...
...whether or not the inventory buildup was intentional.
- In effect, we are assuming that firms purchase their unsold output.



GDP:

An important and versatile concept

We have now seen that GDP measures

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



GNP vs. GDP

- **Gross National Product (GNP):**
Total income earned by the nation's factors of production, regardless of where located.
 - **Gross Domestic Product (GDP):**
Total income earned by domestically-located factors of production, regardless of nationality.
- $$(\text{GNP} - \text{GDP}) = (\text{factor payments from abroad}) - (\text{factor payments to abroad})$$



GNP vs. GDP

- Gross national product (GNP) is the total income earned by a nation's permanent residents (called nationals).
- It differs from GDP in that it includes income that our citizens earn abroad and excludes income that foreigners earn here.

For example, when a Canadian citizen works temporarily in the United States, her production is part of U.S. GDP, but it is not part of US GNI or U.S. GNP (It is part of Canada's GNp.).

So GDP and GNP are quite close.



Discussion question:

In your country,
which would you want
to be bigger, GDP, or GNP?

Why?

It's better to have $GNP > GDP$, because it means our nation's income is greater than the value of what we are producing domestically. If, instead, $GDP > GNP$, then a portion of the income generated in our country is going to people in other countries, so there's less income left over for us to enjoy.



(GNP – GDP) as a percentage of GDP

selected countries, 2002

U.S.A.	1.0%
Angola	-13.6
Brazil	-4.0
Canada	-1.9
Hong Kong	2.2
Kazakhstan	-4.2
Kuwait	9.5
Mexico	-1.9
Philippines	6.7
U.K.	1.6

How to interpret the numbers in this table:

In Canada, GNP is 1.9% smaller than GDP. This sounds like a tiny number, but it means that about 2% of all the income generated in Canada is taken away and paid to foreigners. In Angola, about 14% of the value of domestic production is paid to foreigners.

Why GNP might exceed GDP in a country?



Real GDP vs. nominal GDP

- GDP is the value of all final goods and services produced.
- **Nominal GDP** measures these values using current prices.
- **Real GDP** measure these values using the prices of a base year.
- Real GDP statistic, it controls for inflation by adding up all the goods and services produced in an economy using the same set of prices over time. The same set of prices.
- Real GDP tells us - if the prices of goods and services hadn't changed, how much would GDP have increased, or decreased?



Practice problem, part 1

	2006		2007		2008	
	P	Q	P	Q	P	Q
good A	\$30	900	\$31	1,000	\$36	1,050
good B	\$100	192	\$102	200	\$100	205

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



Answers to practice problem, part 1

nominal GDP *multiply Ps & Qs from same year*

$$2006: \$46,200 = \$30 \times 900 + \$100 \times 192$$

$$2007: \$51,400$$

$$2008: \$58,300$$

real GDP *multiply each year's Qs by 2006 Ps*

$$2006: \$46,200$$

$$2007: \$50,000$$

$$2008: \$52,000 = \$30 \times 1050 + \$100 \times 205$$



Real GDP controls for inflation

Changes in nominal GDP can be due to:

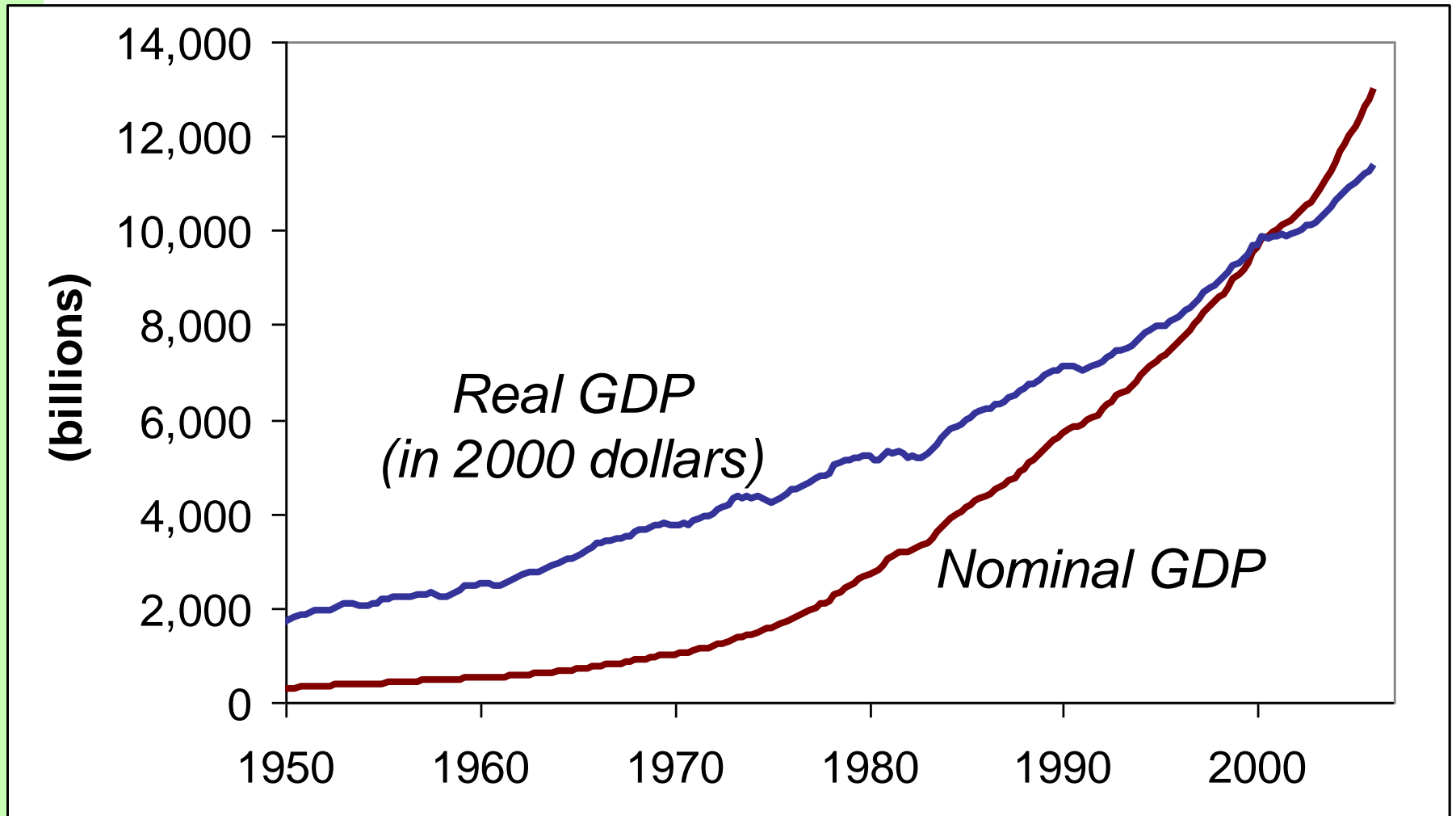
- changes in prices.
- changes in quantities of output produced.

Changes in real GDP can only be due to changes in quantities,

because real GDP is constructed using constant base-year prices.



U.S. Nominal and Real GDP, 1950–2006





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

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



Practice problem, part 2

	Nom. GDP	Real GDP	GDP deflator	Inflation rate
2006	\$46,200	\$46,200		<i>n.a.</i>
2007	51,400	50,000		
2008	58,300	52,000		

- Use your previous answers to compute the GDP deflator in each year.
- Use GDP deflator to compute the inflation rate from 2006 to 2007, and from 2007 to 2008.



Answers to practice problem, part 2

	Nominal GDP	Real GDP	GDP deflator	Inflation rate
2006	\$46,200	\$46,200	100.0	<i>n.a.</i>
2007	51,400	50,000	102.8	2.8%
2008	58,300	52,000	112.1	9.1%

Economists use the term inflation to describe a situation in which the economy's overall price level is rising. The inflation rate is the percentage change in some measure of the price level from one period to the next. Using the GDP deflator, the inflation rate between two consecutive years is computed as follows:

$$\text{Inflation rate in year 2} = \frac{\text{GDP deflator in year 2} - \text{GDP deflator in year 1}}{\text{GDP deflator in year 1}} \times 100.$$



How to calculate Inflation Rate

- Because the GDP deflator rose in year 2014 from 100 to 171,
- the inflation rate is $100 \times (171 - 100)/100$, or 71 percent.
- In 2015, the GDP deflator rose to 240 from 171 the previous year,
- so the inflation rate is $100 \times (240 - 171)/171$, or 40 percent.



Two arithmetic tricks for working with percentage changes

1. For any variables X and Y ,
percentage change in $(X + Y)$
 \approx percentage change in X
+ percentage change in Y

EX: If your hourly wage rises 5% and you work 7% more hours, then your wage income rises approximately 12%.



Two arithmetic tricks for working with percentage changes

2. percentage change in (X/Y)

\approx percentage change in X – percentage change in Y

EX: GDP deflator = $100 \times \text{NGDP}/\text{RGDP}$.

If NGDP rises 9% and RGDP rises 4%,
then the inflation rate is approximately 5%.

For example, if your wage rises 10% while prices rise 6%,
then your real wage – the purchasing power of your wage –
rises by about 4%, because

real wage = (nominal wage)/(price level)

An example

- If workers received a 5 percent wage increase and the rate of inflation was 10 percent, then their real wage:
 - A.increased.
 - B.decreased. Inflation was greater than the wage increase, so inflation adjusted, or real, wages decreased**
 - C.remained constant.
 - D.equaled the nominal wage.
- **The real wage is the nominal wage minus the rate of inflation**
- If workers received a 5 percent wage increase and the rate of inflation was 3 percent, then their real wage:
 - A.increased.**
 - B.decreased.
 - C.remained constant.
 - D.equaled the nominal wage.
- A report indicated that the average real wage in manufacturing declined by 2% between 1990 and 2000. If the CPI equaled 1.30 in 1990, 1.69 in 2000, and the average nominal wage in manufacturing was \$35 in 2000, what was the average nominal wage in manufacturing in 1990?
 - A.\$21.13
 - B.\$26.40
 - C.\$26.92
 - D.\$27.47**



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, 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.



Is GDP a good measure of economic well being

- As we have seen, GDP measures both the economy's total income and the economy's total expenditure on goods and services.
- Thus, **GDP per person tells us the income and expenditure of the average person in the economy.**
- Because most people would prefer to receive higher income and enjoy higher expenditure, GDP per person seems a natural measure of the economic well-being of the average individual.
- Thus, GDP is a good measure of economic well-being because people prefer high to lower incomes.
- But it is not a perfect measure of well - being. For example, exclude the value of leisure and the value of a clean environment.
- Gross domestic product does not include the health of our children, the quality of their education, or the joy of their play.



- Q/ Why should policy makers care about GDP?
- A/ Although GDP is not a perfect measure of well-being, policymakers should care about it because a larger GDP means that a nation can afford better healthcare, better educational systems, and more of the material necessities of life.
- Q/ Why is GDP a good measure of economic well being for most-but not all- purposes?
- GDP includes many things, but it also leaves out a lot of things as well.

Example. 100 people with an annual income of \$50,000 has a GDP of \$5 million. A society in which 10 people earn \$500,000 and 90 suffer still have a GDP of \$5 million, but they are not equivalent.



Ch.4: Consumer Price Index (CPI)

- In this chapter, we discuss how the consumer price index is calculated and what problems arise in its measurement.
- We also consider how this index compares to the GDP deflator, another measure of the overall level of prices, which we examined in the preceding chapter.



Consumer Price Index (CPI)

- A measure of the overall level of prices
- CPI is used to monitor changes in the cost of living over time. When the CPI rises, the typical family has to spend more money to maintain the same standard of living.
- Published by the Bureau of Labor Statistics (BLS)
- Uses:
 - tracks changes in the typical household's cost of living
 - adjusts many contracts for inflation (“COLAs”)
 - allows comparisons of dollar amounts over time



- Regarding the comparison of dollar figures from different years:
- If we want to know whether the average college graduate today is better off than the average college graduate of 1975, we can't simply compare the nominal salaries, because the cost of living is so much higher now than in 1975.
- We can use the CPI to express the 1975 in “current dollars”, i.e. see what it would be worth at today's prices.
- Also: when the price of oil (and hence gasoline) shot up in 2000, some in the news reported that oil prices were even higher than in the 1970s. This was true, but only in nominal terms. If you use the CPI to adjust for inflation, the highest oil price in 2000 is still substantially less than the highest oil prices of the 1970s.



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

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



Calculating CPI and Inflation Rate

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

Basket = 4 hot dogs, 2 hamburgers

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

Year	Price of Hot Dogs	Price of Hamburgers
2013	\$1	\$2
2014	2	3
2015	3	4

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

2013	$(\$1 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 2 \text{ hamburgers}) = \8 per basket
2014	$(\$2 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$3 \text{ per hamburger} \times 2 \text{ hamburgers}) = \14 per basket
2015	$(\$3 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$4 \text{ per hamburger} \times 2 \text{ hamburgers}) = \20 per basket

Step 4: Choose One Year as a Base Year (2013) and Compute the Consumer Price Index in Each Year

2013	$(\$8 / \$8) \times 100 = 100$
2014	$(\$14 / \$8) \times 100 = 175$
2015	$(\$20 / \$8) \times 100 = 250$

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

2014	$(175 - 100) / 100 \times 100 = 75\%$
2015	$(250 - 175) / 175 \times 100 = 43\%$



Exercise: *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 (use 2002 as the base year)
- the inflation rate the percentage change in the price index from the preceding period.

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



Answers:

	Cost of basket	CPI	Inflation rate
2002	\$350	100.0	<i>n.a.</i>
2003	370	105.7	5.7%
2004	400	114.3	8.1%
2005	410	117.1	2.5%

The consumer price index is 100 in 2002. (The index is always 100 in the base year.) The consumer price index is 105.7 in 2003. This means that the price of the basket in 2003 is 105.7 percent of its price in the base year. Put differently, a basket of goods that costs \$100 in the base year costs \$105.7 in 2003. Similarly, the consumer price index is 117.1 in 2005, indicating that the price level in 2005 is 117.1 percent of the price level in the base year.



The composition of the CPI's "basket"

Food and bev.

Housing

Apparel

Transportation

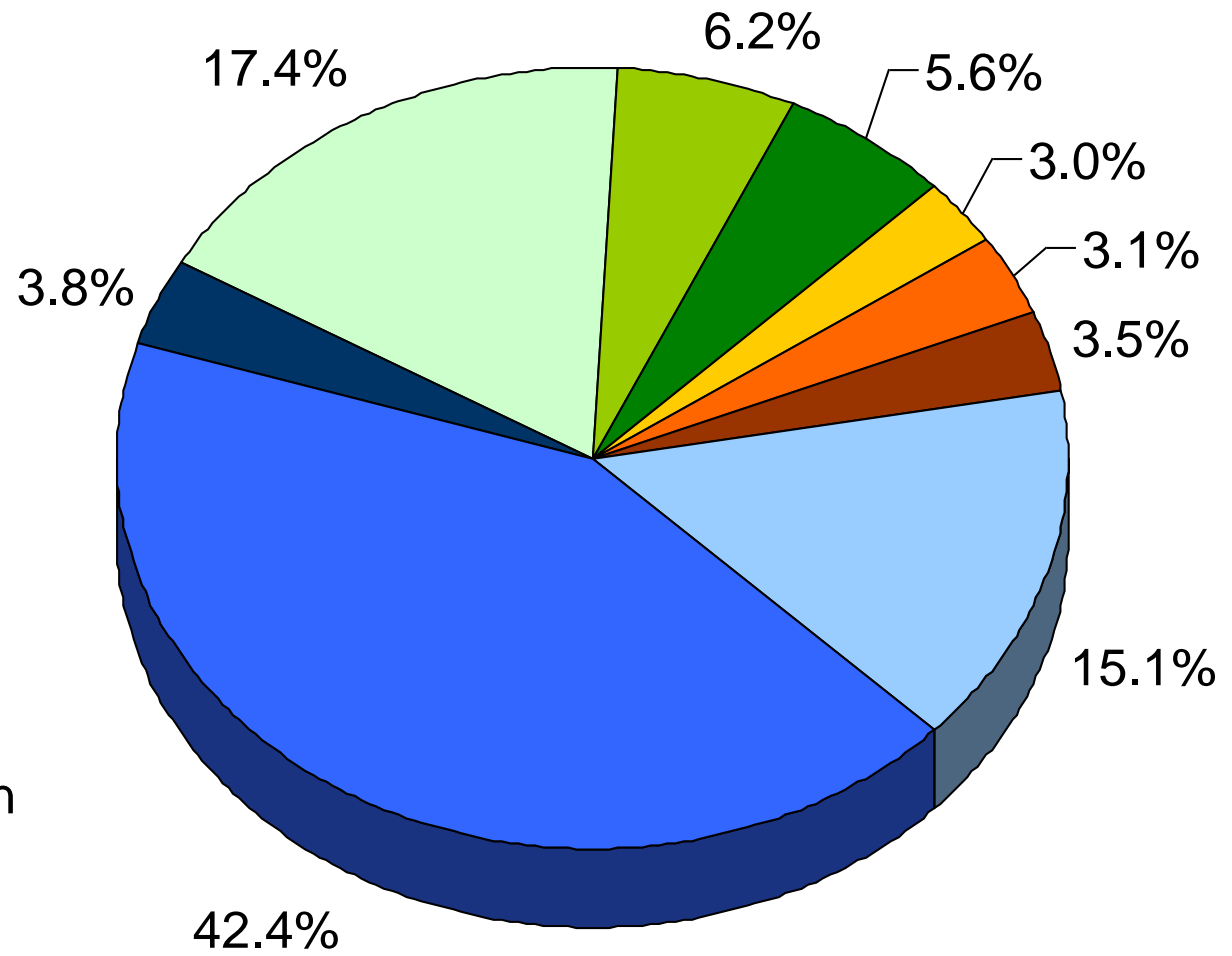
Medical care

Recreation

Education

Communication

Other goods
and services





- figure 1 shows the breakdown of consumer spending into the major categories of goods and services. By far the largest category is housing, which makes up 41 percent of the typical consumer's budget. this category includes the cost of shelter (32 percent), fuel and other utilities (5percent), and household furnishings and operation (4 percent).
- The next large category, at 17 % is transportation, which includes spending on cars gasoline, buses, subway and so on. The next category, at 15 percent, is food and beverages; this includes food at home (8 percent), food away from home (6 percent), and beverages (1percent).
- Next are medical care, recreation and education and communication, each at about 7 percent. this last category includes tuition (3 percent), telephone service (2 percent), information technology such as personal computer and internet services (1 %), and educational books and supplies



Reasons why the CPI may overstate inflation

- The consumer price index is an imperfect measure of the cost of living for three reasons.
- **First, substitution bias**, it does not take into account consumers' ability to substitute toward goods that become relatively cheaper over time.
- **Second, introduction of new goods**, it does not take into account increases in the purchasing power of the dollar due to the introduction of new goods.
- **Third, unmeasured changes in quality**, it is distorted by unmeasured changes in the quality of goods and services. Because of these measurement problems, the CPI overstates annual inflation by about one percentage point.



The size of the CPI's bias

- In 1995, a Senate-appointed panel of experts estimated that the CPI overstates inflation by about 1.1% per year.
- So the BLS made adjustments to reduce the bias.
- Now, the CPI's bias is probably under 1% per year.



CPI vs. GDP Deflator

- Like the consumer price index, the GDP deflator measures the overall level of prices in the economy.
- The two price indexes usually move together, but there are important differences.
- The GDP deflator differs from the CPI because it includes goods and services produced rather than goods and services consumed. As a result, imported goods affect the consumer price index but not the GDP deflator.
- In addition, while the CPI index uses a fixed basket of goods, the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.



Key differences of 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

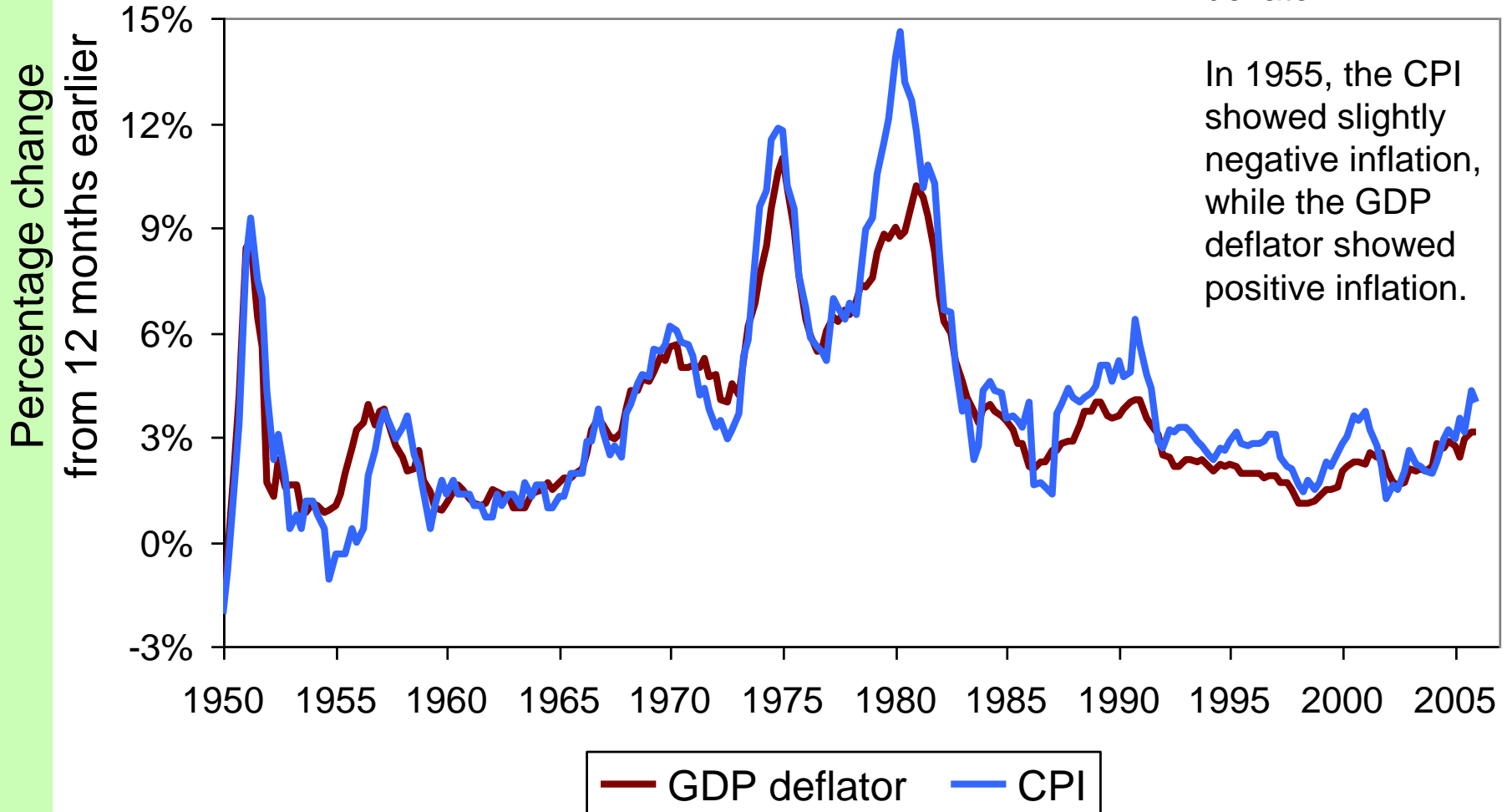
- CPI: fixed
- GDP deflator: changes every year



Two measures of inflation in the U.S.

In 1980, the CPI increased much faster than the GDP deflator.

In 1955, the CPI showed slightly negative inflation, while the GDP deflator showed positive inflation.

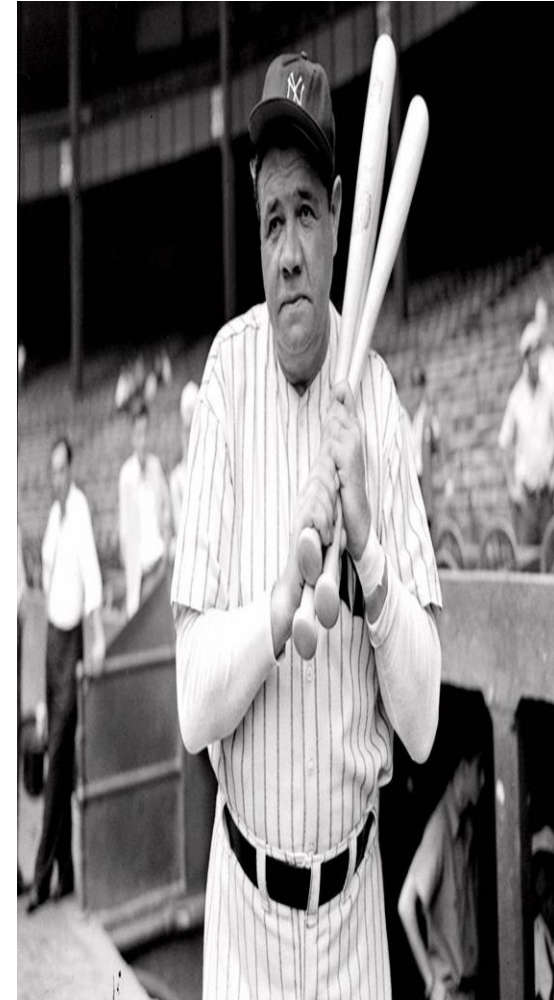




Correcting economic Variables for the effects of inflation

- The purpose of measuring the overall level of prices in the economy is to allow us to compare dollar figures from different times.
- We might use such an index to compare a dollar figure from the past to a dollar figure in the present.
- To compare Ruth's salary to those of today's players, we need to inflate Ruth's salary to turn 1931 dollars into today's dollars.
- The formula for turning dollar figures from year T into today's dollars is the following:

$$\text{Amount in today's dollars} = \text{Amount in year } T \text{ dollars} \times \frac{\text{Price level today}}{\text{Price level in year } T}$$





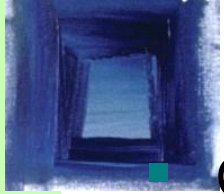
Exercise: *Compute the today's dollar*

A price index such as the consumer price index measures the price level and thus determines the size of the inflation correction.

Let's apply this formula to Ruth's salary. Government statistics show a consumer price index of 15.2 for 1931 and 229.5 for 2012. Thus, the overall level of prices has risen by a factor of 15.1 (calculated from $229.5/15.2$). We can use these numbers to measure Ruth's salary in 2012 dollars, as follows:

$$\begin{aligned}\text{Salary in 2012 dollars} &= \text{Salary in 1931 dollars} \times \frac{\text{Price level in 2012}}{\text{Price level in 1931}} \\ &= \$80,000 \times \frac{229.5}{15.2} \\ &= \$1,207,894.\end{aligned}$$

We find that Babe Ruth's 1931 salary is equivalent to a salary today of over \$1.2 million.



Real and Nominal Interest Rate

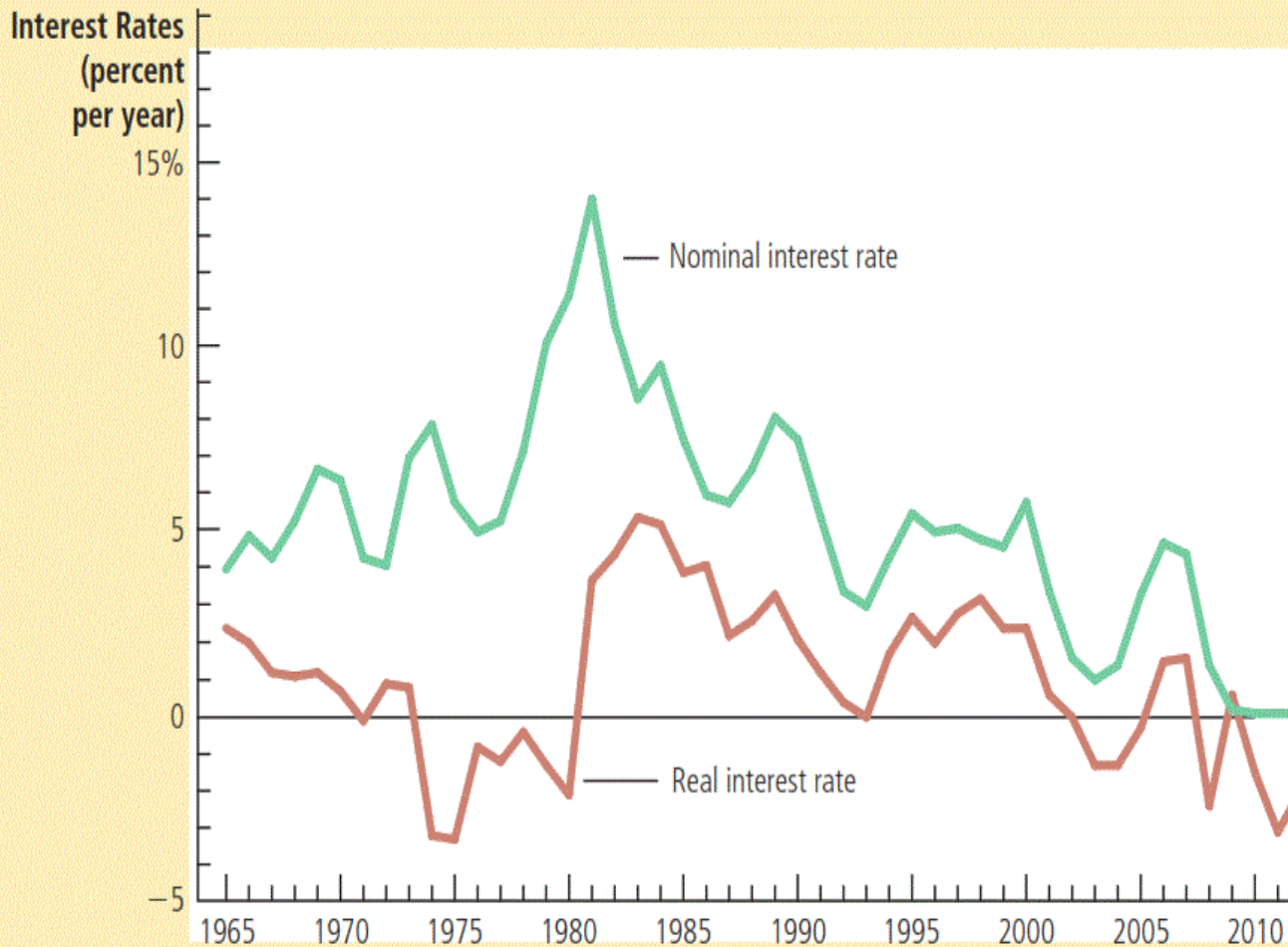
- Correcting economic variables for the effects of inflation is particularly important.
- The very concept of an interest rate necessarily involves comparing amounts of money at different points in time.
- That is, you have to correct for the effects of inflation.
- **Nominal interest rate: the interest rate as usually reported without a correction for the effects of inflation**
- **Real interest rate the interest rate corrected for the effects of inflation**
- **Real interest rate = Nominal interest rate - Inflation rate.**
- The nominal interest rate tells you how fast the **number of dollars** in your bank account rises over time, while the real interest rate tells you how fast the **purchasing power** of your bank account rises over time.

FIGURE 3

Real and Nominal Interest Rates

This figure shows nominal and real interest rates using annual data since 1965. The nominal interest rate is the rate on a three-month Treasury bill. The real interest rate is the nominal interest rate minus the inflation rate as measured by the consumer price index. Notice that nominal and real interest rates often do not move together.

Source: U.S. Department of Labor; U.S. Department of Treasury.



One feature of this figure is that the nominal interest rate almost always exceeds the real interest rate. This reflects the fact that the U.S. economy has experienced rising consumer prices in almost every year during this period.

By contrast, if you look at data for the U.S. economy during the late 19th century or for the Japanese economy in some recent years, you will find periods of deflation. During deflation, the real interest rate exceeds the nominal interest rate.



An example

To keep things simple, let's suppose that Sally is a movie fan and buys only DVDs. When Sally made her deposit, a DVD at her local movie store cost \$10. Her deposit of \$1,000 was equivalent to 100 DVDs. A year later, after getting her 10 percent interest, she has \$1,100. How many DVDs can she buy now? It depends on what has happened to the price of a DVD. Here are some examples:

- Zero inflation: If the price of a DVD remains at \$10, the amount she can buy has risen from 100 to 110 DVDs. The 10 percent increase in the number of dollars means a 10 percent increase in her purchasing power.
- Six percent inflation: If the price of a DVD rises from \$10 to \$10.60, then the number of DVDs she can buy has risen from 100 to approximately 104. Her purchasing power has increased by about 4 percent.
- Ten percent inflation: If the price of a DVD rises from \$10 to \$11, she can still buy only 100 DVDs. Even though Sally's dollar wealth has risen, her purchasing power is the same as it was a year earlier.
- Twelve percent inflation: If the price of a DVD increases from \$10 to \$11.20, the number of DVDs she can buy has fallen from 100 to approximately 98. Even with her greater number of dollars, her purchasing power has decreased by about 2 percent.



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



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



Exercise:

Compute labor force statistics

U.S. adult population by group, June 2006

Number employed	=	144.4 million
Number unemployed	=	7.0 million
Adult population	=	228.8 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



Answers:

- data: $E = 144.4$, $U = 7.0$, $POP = 228.8$
- labor force
 $L = E + U = 144.4 + 7 = \underline{151.4}$
- not in labor force
 $NILF = POP - L = 228.8 - 151.4 = \underline{77.4}$
- unemployment rate
 $U/L \times 100\% = (7/151.4) \times 100\% = \underline{4.6\%}$
- labor force participation rate
 $L/POP \times 100\% = (151.4/228.8) \times 100\% = \underline{66.2\%}$



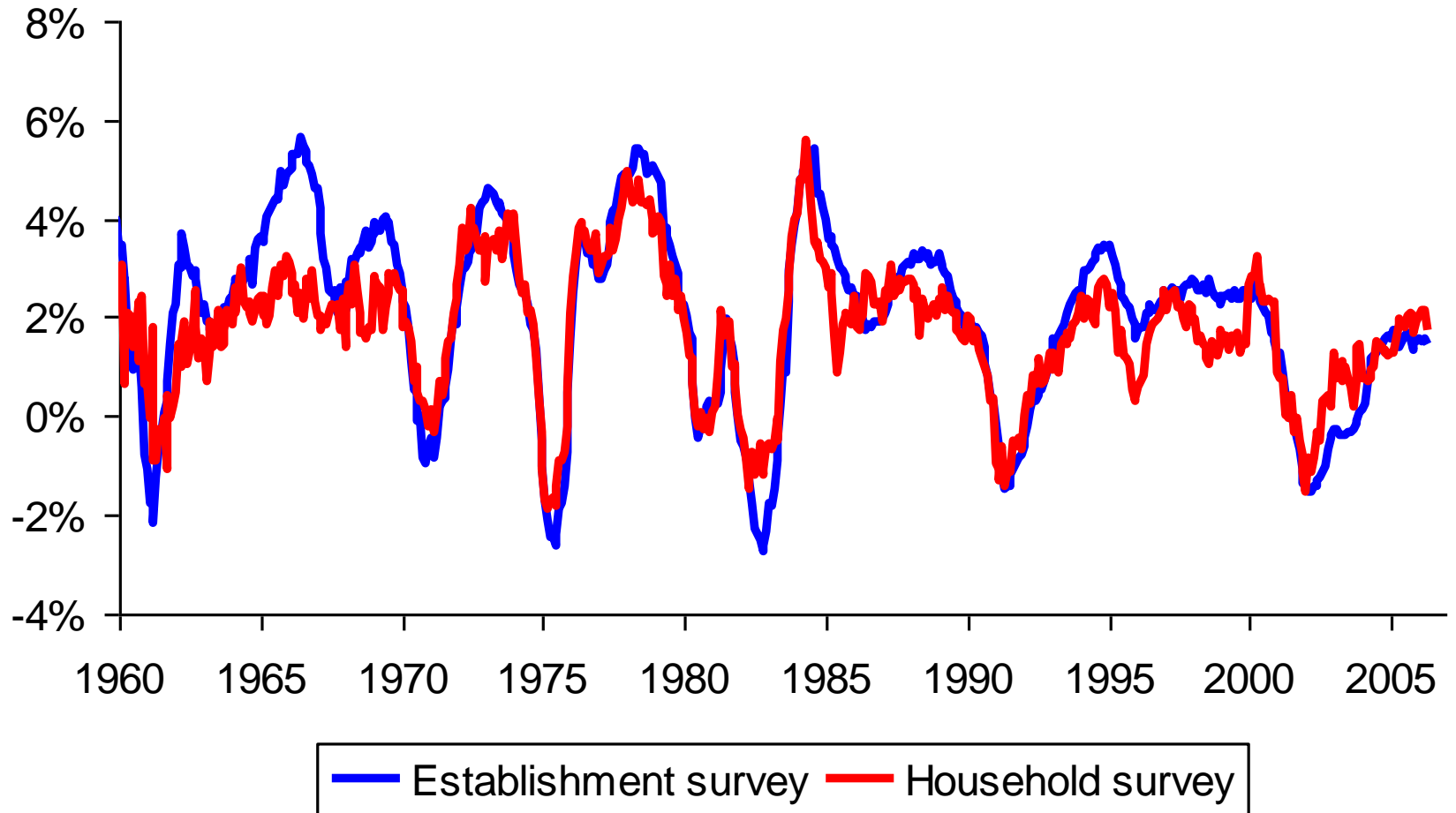
The establishment survey

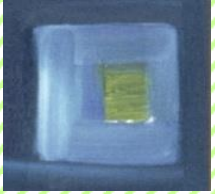
- The BLS obtains a second measure of employment by surveying businesses, asking how many workers are on their payrolls.
- Neither measure is perfect, and they occasionally diverge due to:
 - treatment of self-employed persons
 - new firms not counted in establishment survey
 - technical issues involving population inferences from sample data



Two measures of employment growth

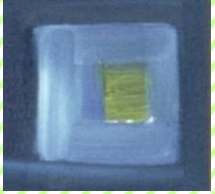
Percentage change
from 12 months earlier





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

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.