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## Chapter 7 (19)

# GDP: Measuring Total Production and Income

### *Chapter Summary*

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While **microeconomics** is the study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices, **macroeconomics** is the study of the economy as a whole. This includes such topics as **economic growth**, **business cycles**, the inflation rate, employment, unemployment, and trade with other nations. In order to talk about these topics, it is necessary to be able to measure how the economy is performing and make comparisons between time periods and countries.

To measure the performance of the economy, economists use a measure of economic activity called **gross domestic product** (GDP). In this chapter, you will learn about GDP: how it is constructed, what its components are, and its strengths and weaknesses as a measure of production. Also covered in the chapter is the concept of real and nominal variables and a price index referred to as the **GDP deflator**.

### *Learning Objectives*

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When you finish this chapter, you should be able to:

1. **Explain how total production is measured.** Total production is measured by **gross domestic product (GDP)**, which is the value of all **final goods and services** produced in an economy during a period of time. When we measure the value of total production in the economy by calculating GDP, we are simultaneously measuring the value of total income. GDP is divided into four major categories of expenditures: consumption, investment, government purchases, and net exports. We can also calculate GDP by adding up the **value added** of every firm involved in producing final goods and services.
2. **Discuss whether GDP is a good measure of well-being.** GDP does not include household production, which refers to goods and services people produce for themselves, or production in the **underground economy**, which consists of concealed buying and selling. The underground economy in some poorer countries may be more than half of measured GDP. GDP is a flawed measure of well-being because it does not include the value of leisure, it is not adjusted for pollution or other negative effects of production, and it is not adjusted for changes in crime and other social problems.
3. **Discuss the difference between real GDP and nominal GDP.** **Nominal GDP** is the value of goods and services evaluated at current year prices. **Real GDP** is the value of goods and services evaluated at **base year** prices. By keeping prices constant, we know that changes in real GDP represent changes in the quantity of goods and services produced in the economy. Real GDP is greater than nominal

GDP in years before the base year and less than nominal GDP for years after the base year. The **GDP deflator** is a measure of the price index and is calculated as  $(\text{Nominal GDP}/\text{Real GDP}) \times 100$ .

4. **Become familiar with other measures of total production and total income.** **Gross domestic product (GDP)** is the most important measure of total production and total income. As we will see in later chapters, for some purposes, other measures of total production and total income turn out to be more useful than GDP. These other measures are: gross national product (GNP), net national product (NNP), national income, personal income, and disposable personal income.

## Chapter Review

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### Chapter Opener: Increases in GDP Help Revive American Airlines (pages 212–213)

Why is GDP important to you? Economic expansions and contractions have a dramatic impact on business outcomes. American Airlines, for example, flies more passengers than any airline in the world. In 2006 they earned a profit and continued to earn a profit during the first three months of 2007, unlike their large losses of 2005. This led to a decision by American Airlines to purchase 47 new jets from Boeing. The increase in profits and the subsequent purchase of additional jets were due to an increase in demand for air travel. American Airlines' situation is an effect of economic expansion or of the business cycle, known as the periodic expansion and contraction in the level of production in the United States.



#### Helpful Study Hint

Read *An Inside Look* at the end of the chapter for an example of how another segment of the transportation business has experienced an economic slowdown in 2006. Pay attention to how this contrasts with the profits that American Airlines was experiencing.

Would you rather work in China, which has a GDP of over 10 percent, or in Canada, which has a GDP of over only 2 percent? *Economics in YOUR Life!* at the start of this chapter poses this question. Keep the question in mind as you read the chapter. The authors will answer the question at the end of the chapter.

### 7.1 LEARNING OBJECTIVE

## 7.1 Gross Domestic Product Measures Total Production (pages 215–222)

**Learning Objective 1** Explain how total production is measured.

An economy that produces a large quantity of goods and services creates an interesting measurement problem. How do we add together the production of different goods and services to arrive at an aggregate measure of total production?

Economists have developed a method of aggregating the wide variety of production by calculating a measure called **gross domestic product** or **GDP**. GDP is defined as the market value of all **final goods and services** produced in a country during a period of time. We aggregate goods by adding their value, and we determine their value by their price. We count only newly-produced goods and services, not all

transactions, and we count only transactions that have a market price. **Transfer payments**, such as Social Security and unemployment insurance, are not counted in GDP because they are payments by the government for which the government does not receive a new good or service in return. **Intermediate goods** are not counted because they are an input into a final good. For example, General Motors produces cars, but it does not produce the tires that go on the car. General Motors buys tires from Goodyear and Michelin. The tires are an intermediate good. In calculating GDP, we include the value of the General Motors truck but not the value of the tire. If we included the value of the tire, we would be *double counting*: The value of the tire would be counted once when the tire company sold it to General Motors, and a second time when General Motors sold the truck, with the tire installed, to a consumer. GDP is the sum of price multiplied by quantity for all final goods and services produced.

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 **Helpful Study Hint**


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Work through *Solved Problem 7-1* to practice calculating GDP. Understanding these calculations and how GDP is measured is important in mastering macroeconomics.

When we calculate GDP as the value of production in a country, we are also measuring the value of income in that country. This is because \$100 spent on a good will ultimately result in \$100 worth of income for the various factors of production that produced that good. The measurement of GDP is often referred to as national income accounting. GDP measures both production and income.

We can also look at GDP from the point of view of expenditures. From the expenditure point of view, we divide GDP into four components:

1. **Consumption** expenditures are expenditures made by households (excluding the purchase of new houses, which we count in investment expenditures).
2. **Investment** expenditures are final goods and services purchased by business firms (equipment for production and new buildings), changes in inventories (which is the difference between production and sales), and residential construction purchased by households. Look at the *Don't Let This Happen to You!* in this chapter in the textbook for more discussion of the definition of investment.
3. **Government purchases** are spending by the federal, state, and local governments.
4. **Net exports** are exports minus imports.

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 **Helpful Study Hint**


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The feature *Don't Let This Happen to YOU!* appears in this and other chapters to show you how to avoid mistakes often made by economics students. A primary component of investment is the purchase of final goods by business firms. These purchases include equipment used in production and buildings used for production, such as factories and office buildings. Investment in the sense we are using it in this chapter does not include buying stocks, bonds, and other types of financial assets.

The components of GDP can be expressed in an equation as:

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

The equation tells us that GDP ( $Y$ ) equals consumption ( $C$ ) plus investment ( $I$ ) plus government purchases ( $G$ ) plus net exports ( $NX$ ).

**Value added** refers to the additional market value a firm gives to a product and is equal to the difference between the price the firm sells a good for and the price it paid other firms for intermediate goods. The value-added method is an alternative way of calculating GDP that also avoids the problem of double counting intermediate goods.

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 **Helpful Study Hint**

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For a good example of government purchases, look at the *Making the Connection: Spending on Homeland Security*. The Department of Homeland Security was established to guard against future terrorist attacks within the United States after the terrorist attacks of September 11, 2001. Spending by this department of the Federal Government is a part of the government spending component of GDP. The Department of Homeland Security provides grants to state and local government agencies to help cover security expenses for state and local needs.

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**7.2 LEARNING OBJECTIVE**

## 7.2 Does GDP Measure What We Want it to Measure? (pages 222-225)

**Learning Objective 2** Discuss whether GDP is a good measure of well-being.

Economists use GDP to measure the total production in the economy. As a measure of production, GDP calculations exclude two types of production: production in the home and production in the underground economy. Household production refers to goods and services that people produce for themselves, such as the services that a homemaker provides for his or her family. The **underground economy** refers to the buying and selling of goods and services that are concealed from the government to avoid taxes or regulations because the goods or services are illegal, such as drugs or prostitution. For the United States, these omissions do not cause a serious distortion in the measurement of total production because the underground economy is relatively small and does not change in size very much from year to year. For some lesser developed countries, these values may be very large.

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 **Helpful Study Hint**

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For a good example of how the underground economy contributes to measured GDP, look at the *Making the Connection: How the Underground Economy Hurts Developing Countries*. While the underground economy in the United States is about 10 percent of GDP, in some developing countries, the underground economy may be more than 50 percent of GDP. The underground economy in developing countries, known as the informal sector, can be a sign that government policies are retarding economic growth because they represent activities that we do not measure and include in GDP.

In addition to measuring a country's total production, GDP is also frequently used as a measure of well-being. Although increases in GDP lead to increases in the well-being of a population, it is not a perfect measure for several reasons. GDP does not measure leisure, unless leisure results in a market transaction, such as spending on vacations. GDP also does not subtract the costs of negative non-market effects of production, such as pollution and crime. On the other hand, GDP will increase as households make expenditures to offset the impact of these negative non-market effects of production. Examples of these expenditures include health care costs due to poor air quality or spending on burglar alarms.

GDP also does not say anything about the distribution of income. Is income distributed equally among the people in the economy, or is the income distribution very unequal, so that a few get a lot of the income?



### Helpful Study Hint

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For a good example of how the GDP relates to periods of prosperity, look at the *Making the Connection: Did World War II Bring Prosperity?* During the Great Depression of the 1930s, the unemployment rate in the United States reached the very high level of 10 percent *or more* and did not fall until the United States entered into World War II. Due to increases in production and the military during the years of 1941-1945, the unemployment rate fell to below 2 percent and ushered in what was believed to be a period of prosperity. However, many historians argue that this was not the case for the typical person. Although the war increased production for military goods, the typical person did not prosper during this time due to the low production and subsequent availability of consumption goods available to the public.

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## Extra Solved Problem 7-2

*Chapter 7 of the textbook includes two Solved Problems. Here is an extra Solved Problem to help you build your skills solving economic problems:*

### *The Relationship Between Real GDP Growth and Per-capita Real GDP Growth*

Supports Learning Objective 2: Discuss whether GDP is a good measure of well-being.

The table below gives real GDP (in billions of 2000 dollars) and U.S. population (in thousands) for the years 1990-2006. For each year, calculate the growth rate in real GDP and the growth rate in per-capita real GDP. Are the growth rates the same?

Year	Real GDP (billions of 2000 dollars)	Population (in thousands)
1990	\$7,112.5	250,132
1991	7,100.5	253,493
1992	7,336.6	256,894
1993	7,532.7	260,255
1994	7,835.5	263,436
1995	8,031.7	266,557
1996	8,328.9	269,667
1997	8,703.5	272,912
1998	9,066.9	276,115
1999	9,470.3	279,295
2000	9,817.0	282,403
2001	9,890.7	285,335
2002	10,048.8	288,216
2003	10,301.0	291,089
2004	10,675.8	293,908
2005	11,003.4	296,639
2006	11,319.4	299,801

## SOLVING THE PROBLEM

### Step 1: Review the chapter material.

This problem is about calculating per capita real GDP, so you may want to review the section “Shortcomings of GDP as a Measure of Well-Being,” which begins on page 224 of the textbook.

### Step 2: Calculate per-capita real GDP and the growth rates.

Per-capita real GDP is the amount of real GDP per person. This is calculated as real GDP/Population. Because real GDP is measured in billions and population is measured in thousands, you need to multiply the value of real GDP/Population by 1,000,000. Then calculate the growth rates. Remember, the growth rate between two years is calculated by subtracting the second year from the first year, dividing by the first year, and multiplying by 100. For example, the growth in real GDP for 2006 equals  $[(\$11,319.4 - \$11,003.4) / \$11,003.4] \times 100 = 2.9\%$ . (Question: Why can't we calculate growth rates for 1990? Answer: Because we would need the real GDP and per capita real GDP values for 1989.)

Results:

Year	Real GDP	Real GDP growth rate	Population	Per capita real GDP	Per capita real GDP growth rate
1990	7,112.5		250,132	28,435	
1991	7,100.5	-0.2%	253,493	28,011	-1.5%
1992	7,336.6	3.3	256,894	28,559	2.0
1993	7,532.7	2.7	260,255	28,944	1.3
1994	7,835.5	4.0	263,436	29,743	2.8
1995	8,031.7	2.5	266,557	30,131	1.3
1996	8,328.9	3.7	269,667	30,886	2.5
1997	8,703.5	4.5	272,912	31,891	3.3
1998	9,066.9	4.2	276,115	32,837	3.0
1999	9,470.3	4.4	279,295	33,908	3.3
2000	9,817.0	3.7	282,403	34,762	2.5
2001	9,890.7	0.8	285,335	34,663	-0.3
2002	10,048.8	1.6	288,216	34,866	0.6
2003	10,301.0	2.5	291,089	35,388	1.5
2004	10,675.8	3.6	293,908	36,324	2.6
2005	11,003.4	3.1	296,639	37,094	2.1
2006	11,319.4	2.9	299,801	37,756	1.8

Using these numbers, we can calculate the average annual growth rate in real GDP and per capita real GDP for this time period by adding up the 16 annual growth rates listed in the table and dividing by 16. Performing these calculations, we find that the average annual growth rate for real GDP is 3.0%, while for the same period, per-capita real GDP grew at an average annual rate of 1.8%. This would suggest that the real GDP growth rate for the U.S. during this period overstates the amount of growth experienced by individuals and families.

### 7.3 LEARNING OBJECTIVE

## 7.3 Real GDP versus Nominal GDP (pages 225-228)

**Learning Objective 3** Discuss the difference between real GDP and nominal GDP.

Since GDP is calculated using the quantities of final goods and services produced at current market prices, GDP can change because (1) production changes or (2) the prices of goods and services change. If the price of a product increases from one year to the next and we produce the same quantity of the product in both years, GDP will be higher in the year with the higher price even though production has not increased.

To remedy this problem, economists have developed an alternative measure called real GDP. **Real GDP** is calculated by designating a particular year as the *base year*. The prices of goods and services in the

base year are used to calculate the value of goods and services in all other years. GDP is often referred to as either **nominal GDP** or current dollar GDP, and real GDP is often called constant dollar GDP.

In an economy with rising prices, nominal GDP will be smaller than real GDP in years before the base year, and nominal GDP will be larger than real GDP in years after the base year. In the base year, nominal GDP and real GDP will have the same value.

We can use the values of nominal and real GDP to calculate a measure of **prices levels** in the economy. The **GDP deflator** is a measure of the average prices of goods and services compared to the base year. The GDP deflator is calculated as:

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

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### Helpful Study Hint

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A value of the GDP deflator of 116 tells us that the average price of goods and services is 16 percent higher than the average price in the base year. This is not the inflation rate.

## 7.4 LEARNING OBJECTIVE

### 7.4 Other Measures of Total Production and Total Income (pages 228–231)

**Learning Objective 4** Become familiar with other measures of total production and total income.

The Bureau of Economic Analysis (BEA) calculates several other measures of production and income in addition to GDP. These are Gross National Product (GNP), Net National Product (NNP), National Income, Personal Income, and Disposable Personal Income. Each of these gives a slightly different measure of production and income in a country. No one measure is better than another – they just measure things in a different way.

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### Helpful Study Hint

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For an example of how economic growth influences our lives, read the *Economics in YOUR Life!* feature at the end of the chapter. While a country that has a higher growth rate, such as China, is increasing the production of goods and services faster than a country with a lower growth rate, such as Canada, it is not necessarily true that the higher growth rate country is a “better” place to live. The growth rate measures the rate of change of production of goods and services. It does not measure the amount of goods and services (just the rate of change) and the well-being of people in that country

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## Extra Solved Problem 7-4

*Chapter 7 of the textbook includes two Solved Problems. Here is an extra Solved Problem to help you build your skills solving economic problems:*

### GDP and GNP

Supports Learning Objective 4: Become familiar with other measures of total production and total income.

In 2006, nominal Gross Domestic Product (GDP) was \$13,247 billion and nominal Gross National Product (GNP) was \$13,277 billion. Explain the differences between these two measures of total production.

### SOLVING THE PROBLEM

**Step 1: Review the chapter material.**

This problem is about two different measures of production, gross domestic product and gross national product, so you may want to review the definitions of these terms on pages 215 and 229 of the textbook.

**Step 2: Explain the differences.**

GDP measures final goods and services produced within the United States, and GNP is the value of final goods and services produced by the residents of the United States, even if that production takes place outside the United States.

Because in 2006, GNP was larger than GDP, income earned from the rest of the world (by U.S. firms and individuals outside the United States) must have been larger than income payments for production in the United States made to the foreign firms and foreign households. In this case, the difference was \$30 billion—an amount that is only about one-quarter of one percent of GDP.

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## Key Terms

**Business cycle.** Alternating periods of economic expansion and economic recession.

**Consumption.** Spending by households on goods and services, not including spending on new houses.

**Economic growth.** The ability of an economy to produce increasing quantities of goods and services.

**Expansion.** The period of a business cycle during which total production and total employment are increasing.

**Final good or service.** A good or service purchased by a final user.

**GDP deflator.** A measure of the price level, calculated by dividing nominal GDP by real GDP, and multiplying by 100.

**Government purchases.** Spending by federal, state, and local governments on goods and services.

**Gross domestic product (GDP).** The market value of all final goods and services produced in a country during a period of time.

**Inflation rate.** The percentage increase in the price level from one year to the next.

**Intermediate good or service.** A good or service that is an input into another good or service, such as a tire on a truck.

**Investment.** Spending by firms on new factories, office buildings, machinery, and inventories, and spending by households on new houses.

**Macroeconomics.** The study of the economy as a whole, including topics such as inflation, unemployment, and economic growth.

**Microeconomics.** The study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices.

**Net exports.** Exports minus imports.

**Nominal GDP.** The value of final goods and services evaluated at current year prices.

**Price level.** A measure of the average prices of goods and services in the economy.

**Real GDP.** The value of final goods and services evaluated at base year prices.

**Recession.** The period of a business cycle during which total production and total employment are decreasing.

**Transfer payments.** Payments by the government to individuals for which the government does not receive a good or service in return.

**Underground economy.** Buying and selling of goods and services that is concealed from the government to avoid taxes or regulations or because the goods and services are illegal.

**Value added.** The market value a firm adds to a product.

## Self-Test

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(Answers are provided at the end of the Self-Test.)

### Multiple-Choice Questions

1. Which of the following is a macroeconomic study?
  - a. the study of how households and businesses make choices
  - b. the study of how households and businesses interact in markets
  - c. the study of how the government attempts to influence the choices of households and businesses
  - d. the study of how fast prices in general are increasing
  
2. The use of macroeconomic analysis to help the federal government design policies that help the economy run more efficiently is
  - a. an absolute necessity, according to economists.
  - b. a practice suggested by politicians but not by economists.
  - c. a controversial question among economists.
  - d. ideal in theory but nonexistent in practice because our knowledge of the economy as a whole is in fact very limited.
  
3. How does the Bureau of Economic Analysis of the U.S. Department of Commerce measure GDP?
  - a. by adding the quantities produced of every good and service in the economy
  - b. by adding the *value* in dollar terms of all of the final goods and services produced domestically
  - c. by ascribing a historic *value* to all of the quantities produced in the economy
  - d. in some cases, by adding quantities, and in others by adding the *value* of goods and services produced
  
4. Which is the largest component of GDP?
  - a. consumption
  - b. investment
  - c. government purchases
  - d. exports
  
5. Which of the following are not part of “final goods,” as used in the definition of GDP?
  - a. consumption goods
  - b. investment goods
  - c. exports
  - d. intermediate goods
  
6. Which of the following is *not* true of GDP?
  - a. GDP is measured by adding up the market values of goods produced, not the quantities of goods produced.
  - b. GDP includes both intermediate and final goods.
  - c. GDP includes only current production.
  - d. GDP is calculated by the Bureau of Economic Analysis (BEA).

7. When a consumer purchases a new computer, how is that purchase counted in GDP?
  - a. by adding the value of the various components of the computer to the final price paid for the computer by the consumer
  - b. by subtracting the value of the components from the price paid by the consumer
  - c. by counting only the value of the computer and ignoring the value of the components
  - d. None of the above. The production and sale of the computer would not be counted in GDP.
8. Which of the following is counted in this year's GDP?
  - a. only this year's production of goods and services
  - b. only goods that are both produced and sold within the United States
  - c. new goods produced and sold this year plus the value of used goods resold this year
  - d. this year's production of goods and services added to the value of GDP last year
9. If we add up the value of every good and service produced in the economy, we get a total that is
  - a. larger than GDP.
  - b. smaller than GDP.
  - c. equal to GDP.
  - d. larger or smaller than GDP depending on whether the economy experiences inflation during the year.
10. If we add up the value of every final good and service produced in the economy, we must get a total that is exactly equal to the value of
  - a. investment.
  - b. net national product.
  - c. disposable personal income.
  - d. all of the income in the economy.
11. Which of the following would be considered a *factor of production*?
  - a. capital
  - b. natural resources
  - c. entrepreneurship
  - d. all of the above
12. In the circular-flow diagram, who supplies factors of production in exchange for income?
  - a. households
  - b. firms
  - c. the government
  - d. all of the above
13. Complete the following sentence: Total income in the economy equals the sum of wages, interest, \_\_\_\_\_ and \_\_\_\_\_.
  - a. dividends; transfer payments
  - b. rent; profit
  - c. taxes; transfer payments
  - d. disposable income; net exports
14. Fill in the blank. The flow of funds from \_\_\_\_\_ into the financial system makes it possible for government and firms to borrow.
  - a. government and firms
  - b. households
  - c. investment banks
  - d. exports

15. An important conclusion to draw from the circular-flow diagram is that
- personal consumption expenditures are equal to the value of GDP.
  - only the value of total income equals the value of GDP, not the value of expenditures.
  - only the total value of expenditures equals the value of GDP, not the value of income.
  - we can measure GDP by calculating the total value of expenditures on final goods and services, or we can measure GDP by calculating the value of total income.
16. Which of the following goods and services would be excluded from *personal consumption expenditures* in the Bureau of Economic Analysis (BEA) statistics?
- medical care
  - education
  - a haircut
  - a new house
17. Which of the following is counted in the *gross private domestic investment* category used by the Bureau of Economic Analysis when measuring GDP?
- business fixed investment
  - residential investment
  - changes in business inventories
  - all of the above
18. Which of the following is included in the economist's definition of *investment*?
- the purchase of new machines, factories, or houses
  - the purchase of a share of stock
  - the purchase of a rare coin or deposit in a savings account
  - all of the above
19. In calculating GDP, which levels of government spending are included in *government purchases*?
- spending by the federal government only
  - spending by federal, state, and local governments
  - spending by the federal government and some state governments, but not local governments
  - spending by governments only as they relate to national security, social welfare, and other national programs
20. When accounting for exports and imports in GDP, which of the following is correct?
- Exports are added to the other categories of expenditures.
  - Imports are added to the other categories of expenditures.
  - Both exports and imports are added to the other categories of expenditures.
  - Both exports and imports are subtracted from the other categories of expenditures.
21. In the equation that sums up the information on the components of GDP,  $Y = C + I + G + NX$ , which component has the largest dollar value?
- C
  - I
  - G
  - NX

22. Which of the following is true about the *consumption* component of U.S. GDP in 2007?
- Consumer spending on durable and nondurable goods was greater than consumption on services.
  - Consumer spending on durable goods was greater than the sum of spending on nondurable goods and on services.
  - Consumer spending on nondurable goods was greater than the sum of spending on nondurable goods and on services.
  - Consumer spending on services was greater than the sum of spending on durable and nondurable goods.
23. Which of the following is true about the *government purchases* component of U.S. GDP in 2007?
- The entire amount was composed of federal government purchases because state and local governments are not included.
  - Most of the spending on education and law enforcement occurs at the federal level.
  - Purchases by the federal government are greater than purchases by state and local governments.
  - Purchases by state and local governments are greater than purchases by the federal government.
24. The difference between the price the firm sells a good for and the price it paid other firms for intermediate goods is called
- producer surplus.
  - fixed investment.
  - value added.
  - profit.
25. Household production and the underground economy
- are fully accounted for in GDP figures gathered by the Commerce Department.
  - are not considered formal production of goods and services and, therefore, are not included when calculating GDP.
  - are important but unaccounted for in the Commerce Department's estimate of GDP.
  - are irrelevant because they constitute only a very small fraction of GDP for most countries.
26. Which of the following is *not* a shortcoming of GDP as a measure of welfare?
- It does not include the value of leisure.
  - It is not adjusted for the effects of pollution caused by the production of goods and services.
  - It only counts final goods and services and not intermediate goods.
  - It is not adjusted for crime and other social problems.
27. According to most economists, is not counting household production or production in the underground economy a serious shortcoming of GDP?
- Most economists would answer "no" because these types of production do not affect the most important use of the GDP measure, which is to see how the economy is performing over short periods of time.
  - Most economists would answer "yes" because these types of production are likely to grow significantly from one year to the next.
  - Most economists would answer "no" because the purpose of measuring GDP is to see how the economy performs over fairly long periods of a decade or more.
  - Most economists would answer "yes" because these types of production are likely to be a large component of the economy (or large percentage of measured GDP), especially in countries like the United States.

28. In many developing countries, the informal sector is \_\_\_\_\_ because taxes are \_\_\_\_\_ and government regulations are \_\_\_\_\_.
- large; low; minimal
  - large; high; extensive
  - small; low; minimal
  - small; low; extensive
29. If Americans still worked 60 hour weeks, as they did in 1890,
- both GDP and the well-being of the typical person would be much higher than they are.
  - both GDP and the well-being of the typical person would be lower than they are.
  - GDP would be much higher than it is, but the well-being of the typical person would not necessarily be higher.
  - GDP would be lower than it is, but the well-being of the typical person would be higher.
30. As the value of a country's GDP increases, the country is likely to
- devote more resources to pollution reduction.
  - devote fewer resources to pollution reduction.
  - include the value of pollution in calculating GDP.
  - exclude the value of pollution in calculating GDP.
31. Real GDP is
- the value of goods and services evaluated at current year prices.
  - the value of goods and services evaluated at base year prices.
  - equal to the value of nominal GDP in every year except for the base year.
  - a measure of output that was replaced by nominal GDP some time ago.
32. Which measure of GDP represents changes in the quantity of goods and services produced in the economy, holding prices constant?
- Nominal GDP
  - Real GDP
  - Net national product
  - None of the above. All GDP measures represent changes in both prices and quantities.
33. Suppose that the base year is 2000 and we want to calculate real GDP for 2007. Which procedure would you use?
- Multiply the quantities in 2000 by the prices in 2007, and add up the results.
  - Multiply the quantities in 2007 by the prices in 2007, and add up the results.
  - Multiply the quantities in 2007 by the prices in 2000, and add up the results.
  - Multiply the quantities in 2007 by the prices in 2007, and subtract them from nominal GDP in 2000.
34. In an economy with rising prices, compared to the base year,
- nominal GDP is larger than real GDP in years after the base year.
  - nominal GDP is equal to real GDP in years after the base year.
  - nominal GDP is larger than real GDP in years before the base year.
  - nominal GDP is equal to real GDP in years before the base year.

35. Growth in the economy is almost always measured as
- growth in nominal GDP.
  - growth in real GDP.
  - growth in net national product.
  - the growth of personal disposable income.
36. Using the year 2000 as the base year, and assuming that prices during the 1990s were lower on average than prices in 2000, we can conclude that
- nominal GDP was lower than real GDP in the 1990s.
  - nominal GDP was higher than real GDP in the 1990s.
  - nominal GDP was equal to real GDP during all these years.
  - neither nominal GDP nor real GDP were good measures of GDP.
37. Over time, prices may change relative to each other. To allow for this, the Bureau of Economic Analysis calculates
- nominal GDP using chain weights.
  - real GDP and the price deflator using chain weights.
  - real GDP and nominal GDP using only base-year prices.
  - real GDP using the prices in the current year.
38. If the GDP deflator has a value of 105.0, then
- the inflation rate is 1.05%.
  - the inflation rate is 0.05%.
  - the inflation rate is 5%.
  - prices have risen 5% since the base year.
39. When a significant fraction of domestic production takes place in foreign-owned facilities, a country's difference between GDP and GNP is as follows:
- GNP will be a more accurate measure of the level of production within the country's borders.
  - GDP will be much larger than GNP.
  - GNP will be almost identical to GDP.
  - GNP will be closer to zero.
40. Which of the following do we subtract from GNP to obtain NNP?
- the production of fixed capital
  - consumption
  - investment
  - depreciation
41. In the National Income and Product Accounts (NIPA), *sales taxes* are referred to as
- subsidies.
  - excise taxes.
  - indirect business taxes.
  - government revenue.
42. The total income actually received by a country's residents is
- larger than the value of GDP.
  - smaller than the value of GDP.
  - exactly equal to the value of GDP.
  - smaller or larger than the value of GDP depending on the year.

43. To calculate *personal income* from national income, which of the following must be done by the BEA?
- add corporate retained earnings
  - add profits
  - add government transfer payments
  - all of the above
44. *Disposable personal income* is equal to
- personal income minus personal tax payments plus government transfer payments.
  - personal income minus government transfer payments plus personal tax payments.
  - personal income minus Social Security payments.
  - the income households have to consume, save, and pay taxes.
45. The best measure of the income households actually have available to spend is
- national income.
  - disposable personal income.
  - net national product.
  - gross domestic product.

**Short Answer Questions**

1. GDP is a measurement of the market value of final goods and services produced in an economy in one year. What is the difference between a final good and an intermediate good? Why do we only count final goods in GDP and not intermediate goods?

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2. Suppose that an economy produces only baseballs and footballs. The prices and quantities of these goods for years 2000 and 2007 are given below.

Year	Baseballs		Footballs	
	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
2000	\$4.00	75	\$6.00	45
2007	\$5.00	100	\$9.00	60

Calculate nominal GDP and real GDP assuming that the year 2000 is the base year. Explain why nominal GDP increased more than real GDP. Also calculate the GDP deflator.

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3. If prices are rising (as they have in the U.S. economy during every year since 1939), in years before the base year, real GDP will be larger than nominal GDP. In years after the base year, nominal GDP will be larger than real GDP. Explain why this is true.

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4. You just bought a 100 year-old house. How does that transaction influence GDP? If the house is purchased with the assistance of a real estate agent, is this payment included in GDP? You then hired a local contractor to re-do the wiring. You paid the contractor \$10,000. The contractor had to buy new wire. How does the purchase of wire by the contractor influence GDP? What if you had done the wiring yourself? In this case, you bought \$2,000 in wire to complete the task. How would this influence GDP? Why do the two methods of wiring the house have different implications for calculating GDP when the actual production (a house rewired) is the same?

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5. What is the difference between GDP and GNP? Is one always larger than the other?

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6. For the years 2005 and 2006, Nominal and Real GDP are given in the table below:

Year	Nominal GDP	Real GDP
2005	\$12,433.9 billion	\$11,003.4 billion
2006	13,194.7 billion	11,319.4 billion

What is the inflation rate for 2006?

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### True/False Questions

- T F 1. Macroeconomics is the study of the economy as a whole.
- T F 2. GDP is the value of all goods and services produced in a country during a time period.
- T F 3. GDP measures the value of final goods and services in an economy or the value of the income earned in producing those goods and services in that economy, for a specific time period.
- T F 4. Consumption spending is divided into two parts, durable goods and non-durable goods.
- T F 5. The purchase of 100 shares of Apple computer stock is an example of investment spending.
- T F 6. Net exports ( $NX$ ) are defined as imports minus exports.
- T F 7. Value added is the price at which a firm sells its output minus the outlay paid to obtain the inputs to produce its output.
- T F 8. Over a given time period, the sum of the value added by all firms is equal to a country's GDP.
- T F 9. In the United States, household production and the underground economy is about 50 percent of GDP.
- T F 10. The value of GDP is reduced to reflect the impact of pollution generated by production.
- T F 11. Real GDP is a better measure of output than nominal GDP.
- T F 12. For every year, nominal GDP is always greater than real GDP.
- T F 13. GNP is the value of final goods and services produced by labor and capital supplied by U.S. residents, even if the production occurs outside the United States.
- T F 14. NNP is GNP plus the amount of depreciation in that time period.
- T F 15. Personal income is the best measure of the income households have available for spending.

### Answers to the Self-Test

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#### Multiple-Choice Questions

Question	Answer	Comment
1	d	Macroeconomics looks at what determines the total level of production of goods and services and the total levels of employment and unemployment. It also looks at what determines the inflation rate, or how fast prices in general are increasing.
2	c	It remains a controversial question among economists as to whether such policies are really needed or whether the economy might in fact work better without them.
3	b	When we measure total production in the economy, we can't just add together the quantities of every good and service because the result would be a meaningless jumble. Instead, we measure production by taking the value in dollar terms of all the goods and services produced, since this approach allows for the use of a common unit of measure: dollars.
4	a	Consumption is about 70 percent of GDP.
5	d	A distinction is made between <i>final</i> goods and services, which are purchased by final users and are not included in the production of any other goods or services, and <i>intermediate</i> goods and services, which are used as inputs into the production of other goods and services.

- 6 b GDP includes only the market value of final goods. If we included the value of the inputs used in making the computer, we would be *double counting*!
- 7 c To avoid double counting, GDP only counts final goods and services.
- 8 a GDP includes only production that takes place during the indicated time period. GDP does not include the value of used goods. If you buy a DVD and six months later you resell that DVD, the purchase is not included in GDP.
- 9 a Adding up the value of every good and service would include the values of many intermediate goods that are not counted in GDP.
- 10 d When we measure the value of total production in the economy by calculating GDP, we are simultaneously measuring the value of total income.
- 11 d Firms use the *factors of production* – entrepreneurship, labor, capital, and raw materials – to produce goods and services. (For brief definitions of *entrepreneur* and *capital*, see the glossary at the end of Chapter 1.)
- 12 a Firms use the *factors of production* to produce goods and services. Households supply the factors of production to firms in exchange for income.
- 13 b The sum of wages, interest, rent, and profit is total income in the economy.
- 14 b The flow of funds from households into the financial system makes it possible for government and firms to borrow.
- 15 d An important conclusion to draw from the circular flow diagram is that we can measure GDP by calculating the total value of expenditures on final goods and services, or we can measure GDP by calculating the value of total income.
- 16 d Personal consumption expenditures are made by households and are divided into expenditures on *services*, such as medical care, education, and haircuts; expenditures on *nondurable goods*, such as food and clothing; and expenditures on *durable goods*, such as automobiles and furniture. The spending by households that is not included in consumption is spending on new houses. Spending on new houses is included in investment expenditures.
- 17 d Gross private domestic investment (or simply “investment”) is divided into three categories: *Business fixed investment* is spending by firms on new factories, office buildings, and machinery, which are used by firms in producing other goods. *Residential investment* is spending by households on new housing. *Changes in business inventories* are also included in investment.
- 18 a Economists reserve the word *investment* for purchases of machinery, factories, and houses. Why don’t economists include purchases of stock or rare coins or deposits in savings accounts in the definition of investment? The reason is that these other activities don’t result in the production of new goods.
- 19 b That is the definition of government purchases.
- 20 a Exports are goods and services produced in the United States, but purchased by foreign businesses, households, and governments. We need to add exports to our other categories of expenditures because otherwise we would not be including all new goods and services produced in the United States. Imports are goods and services produced in foreign countries, but purchased by U.S. businesses, households, and governments. We need to subtract imports from total expenditures, because otherwise we would be including spending that does not result in production of new goods and services in the United States.
- 21 a Figure 7-2 shows the values of the components of GDP for the year 2006. The graph in the figure highlights the fact that consumption is by far the largest component of GDP.

- 22 d Consumer spending on services is greater than the sum of spending on durable and nondurable goods. In the United States and other industrial countries there has been a continuing trend away from the production of goods and towards the production of services.
- 23 d Purchases by state and local governments are greater than purchases by the federal government. In the United States, state and local government purchases are greater than federal government purchases because basic government activities, such as education and law enforcement, occur largely at the state and local levels.
- 24 c Value added refers to the additional market value a firm gives to a product and is equal to the difference between the price the firm sells a good for and the price it paid other firms for intermediate goods.
- 25 c The Commerce Department does not attempt to estimate the value of goods and services that are not bought and sold in markets. Individuals and firms sometimes conceal the buying and selling of goods and services, so they will not have to pay taxes on the income received.
- 26 c The omission of intermediate goods in the calculation of GDP is to avoid counting goods and services twice – or double counting.
- 27 a The most important use of GDP is to measure how the economy is performing over short periods of time, such as from one year to the next. For this purpose, omitting household production and production in the underground economy won't have much effect, because these types of production are not likely to be significantly larger or smaller fractions of total production from one year to the next.
- 28 b The informal sector is large in developing countries because taxes are high and government regulations are extensive. Many economists believe taxes in developing countries are so high because these countries are attempting to pay for government sectors that are as large relative to their economies as the government sectors of industrial economies.
- 29 c GDP does not include the value of leisure, but we may value leisure as much as the income we sacrifice in order to obtain it. Output growth also comes with social problems attached, as described in the section of this chapter titled “*GDP Is Not Adjusted for Pollution or Other Negative Effects of Production.*”
- 30 a Increasing GDP often leads countries to devote more resources to pollution reduction.
- 31 b Real GDP is the value of goods and services evaluated at base year prices. Real GDP is calculated by designating a particular year as the base year. The prices of goods and services in the base year are used to calculate the value of goods and services in all other years.
- 32 b By keeping prices constant, we know that changes in real GDP represent changes in the quantity of goods and services produced in the economy. Holding prices constant means that the purchasing power of a dollar remains the same from one year to the next.
- 33 c Real GDP is the value of all final goods and services, evaluated at base year prices.
- 34 a Because nominal GDP uses current prices and real GDP uses bases year prices, in an economy with rising prices current prices will be above base year prices and nominal GDP will be larger than real GDP.
- 35 b Growth in the economy is almost always measured as growth in real GDP.

- 36 a As prices rise, nominal GDP rises above real GDP. In the 1990s, prices were on average lower than in 2000, so nominal GDP was lower than real GDP. Since 2000, prices have been on average higher than in 2000, so nominal GDP is higher than real GDP.
- 37 b Because changes in relative prices are not reflected in the fixed prices from the base year, the estimate of real GDP is somewhat distorted. In order to make the calculation of real GDP more accurate, in 1996, the BEA switched to a method that uses “chain-weighted” prices.
- 38 d A GDP Deflator of 105 (or 1.05 before multiplying by 100) indicates that the current level of prices is 1.05 times the base year, not the last year, or prices have risen 5 percent from the base year.
- 39 b When a significant fraction of domestic production takes place in foreign-owned facilities, GDP will be much larger than GNP, and will be a more accurate measure of the level of production within the country’s borders.
- 40 d If we subtract this value from GNP, we are left with net national product or NNP. In the NIPA tables, depreciation is referred to as the *consumption of fixed capital*, or the *capital consumption allowance*.
- 41 c In order to calculate the total income actually received by a country’s residents, the BEA has to subtract the value of sales taxes from net national product. In the NIPA tables, sales taxes are referred to as *indirect business taxes*.
- 42 b The BEA has to subtract the value of sales taxes (indirect business taxes) and depreciation from gross domestic product in order to arrive at national income. A country’s residents do not receive either depreciation or the taxes paid on purchases, so neither should be included in a measure of total income received.
- 43 c Personal income is income received by households. To calculate personal income, we need to subtract the earnings that corporations retain rather than pay to shareholders in the form of dividends. We also need to add in the payments received by households from the government in the form of transfer payments or interest on government bonds. Transfer payments, such as Social Security payments or payments to retired government workers, are payments the government makes for which it does not receive a good or service in return.
- 44 a Disposable personal income is equal to personal income minus personal tax payments, such as the federal personal income tax, plus government transfer payments, such as Social Security payments.
- 45 b Disposable personal income is the best measure of the income households actually have available to spend.

### Short Answer Responses

1. A final good is one that is sold to the ultimate user of the product. It is not being purchased with the plan to transform the good and resell it. The alternative to a final good, an intermediate good, is purchased with the intent of using that good in the process of producing another good or service that is resold. Intermediate goods are inputs in a production process. Intermediate goods are excluded because the value of the final goods *includes* the value of the intermediate goods employed in the production of the final good.

2. GDP and Real GDP for 2000 and 2007 are:

Year	Nominal GDP	Real GDP	GDP Deflator
2000	\$570	\$570	100.0
2007	\$1040	\$760	136.8

Nominal GDP has increased for two reasons: Output has increased and the prices of baseballs and footballs have increased.

3. Real GDP uses base year prices. Rising prices imply that in the years prior to the base year, the price used to calculate nominal GDP would be *less* than the price used to calculate real GDP (which is the price in the base year). So in the earlier years, real GDP is greater than nominal GDP. In time periods after the base year, with rising prices, the price level would be larger than the base year price level, so nominal GDP is larger than real GDP. See Figure 7-3 in Chapter 7.
4. Because the house is 100 years old, its purchase will not be included in GDP. It was counted in GDP 100 years ago when it was built. If a real estate agent is employed, the agent's fee should be counted in GDP. The agent produced a service in the current time period, bringing together the buyer and the seller of the house. All of the contractor's wiring fee is included in GDP. The contractor's purchase of wire does not count in GDP, because the wire is included in the contractor's fee. The wire in this case is an intermediate good. If the new homeowner did the wiring, then only the purchase of the wire would count in GDP. In this case, the wire is a final good. The difference in the two approaches to wiring the house is that household production that does not enter a market is not counted in GDP.
5. Gross domestic product is the value of final goods and services produced by labor and capital within the United States. The gross national product, or GNP, is the value of final goods and services produced by labor and capital supplied by residents of the United States, even if the production takes place *outside* of the United States. U.S. firms have facilities in foreign countries, and foreign firms have facilities in the United States. GNP includes foreign production by U.S. companies, but excludes U.S. production by foreign companies. For the United States, they are about the same. One is not necessarily larger than the other.
6. The GDP deflator in 2005 was 113.0 (remember that the GDP deflator is the ratio of Nominal GDP to Real GDP multiplied by 100 or  $= (\text{Nominal GDP}/\text{Real GDP}) \times 100$ ). The GDP deflator in 2006 was 116.6. As measured by the percentage change in the GDP deflator, the inflation rate in 2005 (which is equal to:  $100 \times [(\text{GDP deflator in 2006} - \text{GDP deflator in 2005})/\text{GDP deflator in 2005}]$ ) was 3.2 percent ( $= 100 \times [(116.6 - 113.0)/113.0]$ ).

### True/False Answers

1. T
2. F GDP measures only final goods and services, in an economy, over a well-defined period.
3. T
4. F durables, non-durables and services
5. F This is a financial transaction, not investment.
6. F exports minus imports
7. T
8. T
9. F about 10%

10. F GDP does not subtract “bads” generated by production.
11. T
12. F This is true only for years where prices are greater than base year prices.
13. T
14. F  $NNP = GNP - \text{depreciation}$
15. F Disposable personal income is better because it subtracts taxes.