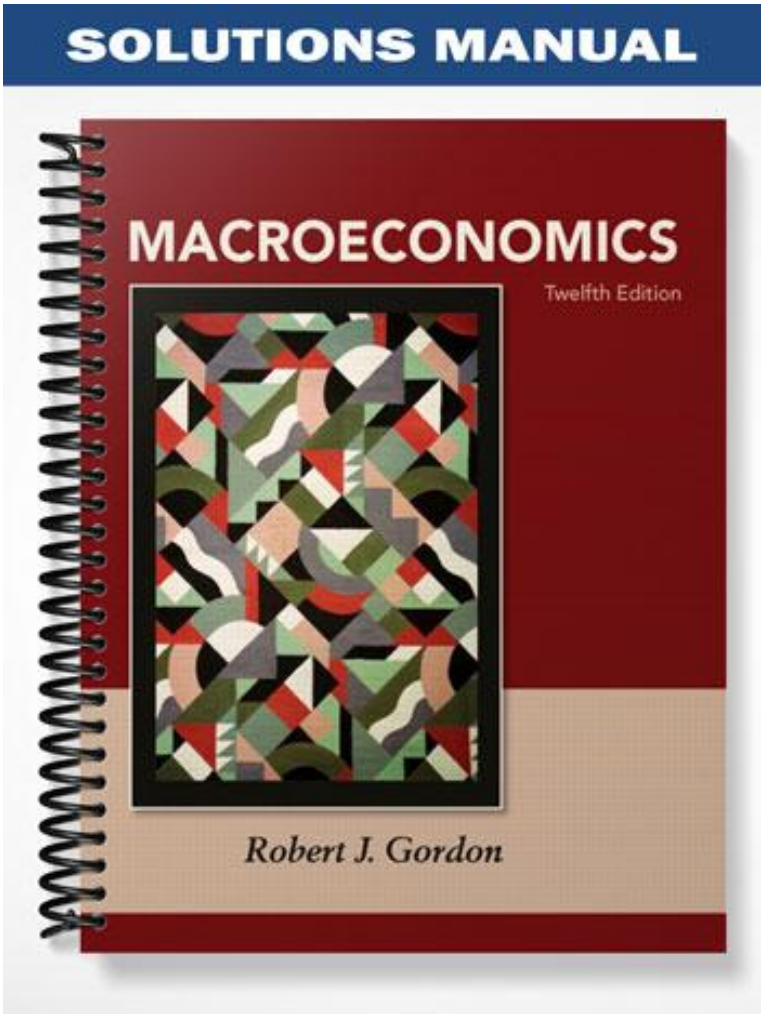
SOLUTIONS MANUAL



Chapter 2
The Measurement of Income, Prices, and Unemployment

■ Chapter Outline

2-1 Why We Care About Income

2-2 The Circular Flow of Income and Expenditure

2-3 What GDP Is, and What GDP Is Not
- a. Defining GDP: What's In and What's Out
- b. Intermediate Goods, Final Goods, and Value Added
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  Box: Where to Find the Numbers: A Guide to the Data
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- a. Types of Investment
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- c. Net Exports and Net Foreign Investment
- d. The Government Sector
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2-5 The "Magic" Equation and the Twin Deficits
- a. Implications of the Equality Between Income and Expenditures
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   a. Real and Nominal Magnitudes
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2-8 Measuring Unemployment
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   Understanding Global Economic Crisis: The Ranks of the Hidden Unemployed

Summary

Appendix

■ Chapter Overview

This chapter provides a straightforward approach to national income accounting and the measurement of prices and unemployment in the economy. By showing how aggregate economic variables are measured, students see both how economic performance can be evaluated and how the validity of our theoretical results can be tested. Therefore, this chapter serves the important purpose of establishing the basic relationship between economic measurement and the theories to be developed later on in the text.

The chapter begins by describing the interrelationships between the various sectors of the economy with circular-flow diagrams. When introducing the circular-flow diagrams, be sure students know the difference between flow variables, which are variables that can only be measured in terms of a specified time period, and stock variables, which are measured at a particular point of time. Then, after giving a detailed definition of GDP, the chapter explains why intermediate goods are not counted in real GDP. It explains that excluded from GDP are the value of personal time spent engaged in activities that are not sold on the market, any costs of environmental degradation, illegal activity, and some other activities paid for in cash, whose employers do not pay social security.

Total expenditure is composed of household, business, government, and net foreign purchases of domestic goods; it is equal to GDP because total income must equal total expenditure for the economy. When explaining the contribution of each sector of the economy to GDP, point out the distinction between consumption spending, done by households, and investment spending, done by businesses. Because the term "investment" is very broad, it is important to clarify that in economics, unless otherwise specified, investment refers to the activity of business firms in acquiring income-yielding capital. Note that what is most commonly regarded as investment by students, household financial investment in stocks and bonds, is not an expenditure item at all in the NIPA, but personal saving. Explain that, because saving is a part of household income that is not consumed, it is a "leakage" out of household income. In the simplest economy with just households and business firms, the equality of investment (I) and saving (S) arises only from the identity that total income must equal total expenditure and not from the direct physical definition of

investment and saving. This is more clearly seen as the economy is generalized to include the other sectors.

The introduction of the government sector adds a government spending component (G) to total expenditure and net tax revenue (T) as another leakage from household income. Also, because GDP measures domestic product, any domestic purchases of foreign products (imports) should be subtracted from total expenditure, while any foreign purchases of domestic products should be added into GDP. Therefore, the inclusion of the foreign sector adds net exports (NX = exports – imports) as a component of total expenditure.

Section 2-5 discusses the "magic" equation. The identity that total income equals total expenditure simplifies to the magic equation, which states that total leakages out of household income ($S + T$) equals total injections of nonconsumption spending ($I + G + NX$). At this point in your lecture, it will be useful to compare this result to that of the simple economy. Point out that the saving-equals-investment result of the simple economy also implies that total leakages equal total injections. However, it is a specific case that ignores the injections and leakages created by the inclusion of the government and foreign sectors. With the inclusion of these sectors, $S = I$ no longer has to hold, and the general result that $S + T = I + G + NX$ becomes the identity. This section concludes with a discussion of the government budget surplus. By rearranging the national income accounting identity of the complete four-sector economy, we see that the size of the government budget surplus ($T - G$) is determined by the excess of investment ($I + NX$) over saving (S). Explain that ($–NX$) represents the amount of foreign capital inflow by saying that the U.S. dollars obtained by foreigners through U.S. purchases of imports will eventually be used by foreigners in the purchasing of U.S. real or financial assets.

Section 2-6 defines and distinguishes between gross and net national product, personal and disposable income, as well as taxes and transfers (Table 2-1). From this, one sees that total leakages are equal to total injections for the economy, the magic equation once again. It continues to explain the definition of personal income and the personal deposable income with numerical examples from the U.S. economy in Table 2-2.

Section 2-7 distinguishes nominal (current-dollar) from real (constant-dollar) magnitudes and applies this distinction to the measurement of GDP. Here Gordon explains why we care about real GDP and inflation or GDP deflator. He also explains how the rate of growth of the GDP and inflation rate can be calculated. In the box *How to Calculate Inflation, Real GDP Growth, or Any Other Growth Rate*, he has provided a simple logarithmic formula that can be applied to any calculator to compute the rate of growth of any variable or the rate of inflation.

In the new Section 2-8, Gordon notes that serious flaws exist in the definition and measurement of the unemployment rate, they may be quantitatively of minor importance, since the official definition exhibits the same cyclical movements that are observed in broader unemployment measures, but it ignores the hidden victims of unemployment. In this section Gordon explain it in a greater detail in a box entitled: *Understanding the Global Economic Crisis:* The Ranks of the Hidden Unemployed. In the Figure 2-5, he has shown in details, how Millions Impacted by Recessions but Not Counted as Unemployed. Be sure to expose the students to this problem about the economic effect of unemployment and recession in the economy.

In the appendix "how we measure the real GDP and the inflation rate," he develops a detailed illustration of the calculation of fixed-weight and chain-weighted real GDP and GDP deflators based on a hypothetical two-good (apples and oranges) economy, explaining both the logic behind each concept and the motivation for using the chain-weighted measures.

■ Changes in the Twelfth Edition

Although the reader will find a large number of changes in Chapter 2, the basic structure of the chapter has not changed much from the 11th edition. In the beginning on page 24, in Section 2-1, Gordon extended the last paragraph by introducing students to how the distress caused to families by the Global Economic Crisis are not included in the official measure of the unemployment rate. In Section 2-3, page 26, the title of Section 2-3 has been changed to "What GDP Is, and What GDP Is Not" In the subtitle "Sold on the market," he added other exclusions from the GDP calculation: illegal activity, such as sales of illegal drugs that are typically bought and sold for cash, some other activities paid for in cash may be excluded because they are hard to measure, including household helpers who are paid in cash and whose employers do not pay social security taxes on their behalf. He has introduced a new Table 2-1 to explain what is in and what is out of GDP on page 29. He has changed the heading of the subtitle on page 29 to "What's 'Domestic' in the Gross Domestic Product (GDP)?" from "GNP versus GDP," and has a different discussion points in the beginning. In the box, "Where to Find the Numbers: A Guide to the Data," the website of U.S. Department of Labor has a different design now. A new subtitle section "What's the 'Gross' in the Gross Domestic Product?" has been added.

In Section 2-4, a new *Global Economic Crisis Focus* box has been added on page 34. In page 35, discussion about leakage and injection has been shortened and the discussion about the linkage of budget deficit to foreign borrowings has been moved to a later section. Similarly, discussion about twin deficit after equation 2.6 has been shortened.

In Section 2-5, the numerical example on page 36 has been changed up to the year 2010 and is followed by a changed discussion and supplemented by a new *Global Economic Crisis Focus* box.

In Section 2-6, Table 2.2 on page 37, the numerical example has been changed and updated from 2007:q2 to 2010:q2 data. And the discussion thereafter has also been changed. On page 40, Figure 2.4 base year price index has been changed from 2000 to 2005 and the range of the time period has been extended to the year 2010.

On page 41in the box: *How to Calculate Inflation, Real GDP Growth, or Any Other Growth Rate*, GDP deflator data for year has been changed from 1974 and 1975 to 2008 and 2009 and is followed by a shortened discussion on page 42. There are substantial changes on the pages 42–46. On page 43, the example about measuring unemployment has been changed from the year 2007 to 2010. Case study 2.9 has been eliminated and it has been replaced with a new Understanding the Global Economic Crisis box: The Ranks of the Hidden Unemployed on pages 44–45 with a new Figure 2-5 Millions Impacted by Recessions but Not Counted as Unemployed.

Summary section has been extended to 10 summary points with a new # 5, "*GDP includes depreciation*."

In the concepts section, there are also some additional sections namely depreciation (consumption of fixed capital), net domestic product, gross, net, private investment.

■ Answers to Questions in Textbook

1. A flow magnitude moves from one economic unit to another over a period of time. A stock magnitude is in the possession of a given economic unit at a particular point in time.

   (a), (b), (e), (f), (j), (k), (l) are flows.

   (c), (d), (g), (h), (i) are stocks.

2. a. No, the peaches are an intermediate good in the production of peach ice cream by the peach maker.
   b. Yes, the new machine is part of private investment.
   c. Yes, your purchase of ice cream is part of consumption expenditures.
   d. No, the peach ice cream is an intermediate good in the production of peach smoothies.
   e. Yes, your cousin's purchase is an export for the United States.
   f. No, only currently produced books would be included in GDP.
   g. Yes, the peaches are part of consumption, but the value of the time you spend in making the ice cream is not included in GDP.
   h. Yes, but unlike the purchase of the machine by a business, your purchase of the ice-cream maker would be part of consumption expenditures and not private investment.
   i. No, you are giving a gift to your cousin; the ice cream was not sold on the market.

3. a. The salary would be included in GNP, but not GDP, since it is income that is earned by an American from production that takes place in Japan.
   b. The profits would be included in GDP, but not GNP, since it is income earned by a foreign company on production that takes place in the United States.
   c. The software is part of exports, which is included in both GDP and GNP.

4. The Europeans are buying goods and services produced in the United States. This makes these purchases part of our exports. Similarly, when an American on vacation in Ireland buys an Irish sweater, that is equivalent to an American who buys the same sweater in a store in the United States that specializes in clothes imported from Ireland.

5. There are at least two reasons why you cannot compare the well-being of the average individual in the two countries simply by comparing the GDPs of the two countries. The first is that the populations of the two countries are different. In particular, the population of China is approximately four times larger than that of the United States. Therefore, if the real GDP of the United States is twice as large as China's, the amount of output for each person in the United States is eight times as large as the amount of output for each person in China.

   A second reason why it is not possible to compare the well-being of the average individual in the two economies simply by comparing their total output is that real GDP provides no information on how that aggregate output is distributed among the each economy's members. For example, if in one economy, a larger percentage of its output is received by a smaller percentage of its population, then

the well-being of a larger percentage of its population would be less than in the other economy, all other things being equal.

6. Because activity in the underground economy goes unrecorded, official measures understate GDP and productivity and overstate unemployment, with the degree of inaccuracy in these measures directly related to the size of the underground economy. This makes it more difficult for policymakers to estimate how close the economy is to its natural real GDP and natural rate of unemployment and to accurately gauge threats of inflation and recession.

7. a. For the interest rate data, go to research.stlouisfed.org/fred2. When you get to that page, click on the link for interest rates, and then click on the link for the Treasury constant maturity page. That page will allow you to either view or download the interest rate data for many Treasury securities, including the two asked for in the question.

   b. To obtain the value of the GDP deflator in the latest quarter, go to www.bea.gov and click on the link for Gross Domestic Product. When that page comes up, click on the link for Gross National Product that follows the caption News Release. It is easier to read and/or print the news release in PDF format rather than HTML format. The GDP deflator is contained in Table 6 and is referred to as the price index for Gross Domestic Product.

   c. These data can be obtained by going to www.bls.gov and clicking on the link for National Employment. When that page comes up, click on the Economic New Releases link. When the new releases page comes up, click on the Employment Situation Summary link. The data you are looking for are contained in Table A.

   d. Follow the same links that are needed to get the GDP deflator. The data you are looking for in this part of the question are contained in Table 3 of the News Release. Data for nominal GDP and nominal personal consumption expenditures are listed in the billions of current dollars portion of Table 3. Data for real GDP and real personal consumption expenditures are listed in the billions of chained (2005) dollars portion of Table 3.

8. a. Savings and taxes are leakages from the spending stream in the circular flow diagram. Savings go into capital markets and taxes go the government. Imports are also leakages from the spending stream and become part of the rest of the world's income.

   b. Private domestic investment and government purchases of goods and services are injections into the spending stream in the circular flow diagram. The funds for private domestic investment come from capital markets. Government purchases of goods and services are financed either through taxes or borrowing from capital markets. Exports are also an injection into the spending stream in the circular flow diagram. They come from the rest of the world.

9. When the government runs a budget surplus, it retires more debt than it issues. The amount of debt retired is the value of the bonds that the government buys from bondholders, which exceeds the value of the bonds that it sells to bondholders when the government runs a budget surplus. As a result, funds flow from the government to capital markets.

10. Domestic income, by definition, includes income earned by the factors of production in current production. But as we move from domestic income to personal income, we subtract from income earned that portion paid to the government as corporate taxes and social security contributions, as well as undistributed corporate profits (i.e., income earned but not received). We also add into the flow of income certain payments such as government transfers (interest on the national debt and welfare payments) and personal interest payments (i.e., income received but not earned).

11. If all parts for the car, other than the tires, are produced in 2010:

    2010: 400 tires @ $75 each = $30,000.

    2011: 100 cars @ $30,000 each = $3,000,000 minus the decrease in inventory of $30,000
    = $2,970,000.

12. a. income: $1,600,000.

    b. consumption expenditures: $1,250,000.

    c. personal saving: $350,000.

    d. investment: $250,000.

13. The "magic equation" tells us that private saving equals the total of domestic private and net foreign investment minus government saving. Therefore, if private saving declines, either government saving must rise to offset that decline or domestic private investment or net foreign investment must decrease to match the decline in private saving.

14. Many alternative combinations of changes in prices and output could yield an increase in nominal GDP; thus, with this limited information, you can't say what happened to output and prices. If real GDP had increased in 2011, then you would know that output had gone up; however, you still would not know what happened to prices.

15. Deflation means that prices are falling. Therefore, the prices used to calculate real GDP would be higher than the prices used to calculate nominal GDP. As a result, real GDP would grow faster than nominal GDP.

16. There are two types of people who fit into the ranks of the "hidden unemployed." The first group consists of people who are forced to work part-time because they cannot find the full-time employment that they desire. People in this group are counted as employed even though they spend less time working than they would like, which means that their labor resources are being under utilized. The second group of people in the ranks of the "hidden unemployed" consists of individuals who have given up looking for work because they have been unable to find work. These "discouraged workers" are not counted as unemployed because they have not sought work within the past four weeks.

    The pink and brown areas of the graph on page 45 shows that the amount of "hidden unemployment" during the Global Economic Crisis surpassed previous recessions, with the exception of the 1981-82 recession. But note that the increase in the amount of "hidden unemployment" was larger during the Global Economic Crisis than it was during the 1981-82 recession. These two facts allow us to conclude that "hidden unemployment" was more severe during the Global Economic Crisis.

    Businesses are more likely to put part-time employees to work on a full-time basis when economic activity picks up, rather hire people with whom they have no employment history. That will contribute to the problem of long-term unemployment, which also became quite severe during the Global Economic Crisis, as we will see in later chapters of the text.

17. The unemployment rate would go down. This is a nice trick that might be used by an administration that wanted to convince people that a prolonged recession is ending (assuming people didn't understand the mechanics of the situation).

18. a. Don is considered unemployed because he is on a temporary layoff.

    b. Ellen is considered employed since she now has another job.

c. Since Frank has resigned his position and is taking no steps to seek part-time work while he is in school, he is considered not in the labor force. On the other hand, since Frank's wife is actively seeking employment, she is considered unemployed.

■ Answers to Problems in Textbook

1. a. Gross domestic product (GDP) equals consumption expenditures plus private domestic investment plus government purchases of goods and services plus net exports. To compute GDP, we first need to compute private domestic investment and net exports. The information given allows us to calculate private domestic investment by adding net fixed investment plus depreciation plus the change in inventory. Therefore, private domestic investment equals 688.2 + 990.8 + 56.5 = 1,735.5. Net exports equal exports minus imports, so that net exports equal 1,096.3 – 1,475.8 = –379.5. Therefore, gross domestic product equals 6,739.4 + 1,735.5 + 1,721.6 + (–379.5) = 9,817.0.

   b. Gross national product equals gross domestic product plus receipts of factor income from the rest of the world minus payment of factor income to the rest of the world. Therefore, gross national product equals 9,817.0 + 382.7 + 343.7 = 9,856.0.

   c. Net domestic product equals gross domestic product minus depreciation. Therefore, net domestic product equals 9,817.0 – 990.8 = 8,826.2.

   d. Domestic income equals net domestic income minus indirect business taxes. Therefore, domestic income equals 8,826.2 – 664.6 = 8,161.6.

   e. Personal income equals domestic income minus undistributed corporate profits minus corporate income taxes minus social security contributions plus government transfer and interest payments. Therefore, personal income equals 8,161.6 – 130.3 – 265.2 – 702.7 + 1,366.3 = 8,429.7.

   f. Disposable personal income equals personal income minus personal taxes. Therefore, disposable personal income equals 8,429.7 – 1,235.7 = 7,194.0.

   g. Personal saving equals disposable personal income minus consumption expenditures minus personal interest payments. Therefore, personal saving equals 7,194.0 – 6.739.4 – 286.2 = 168.4.

2. $NX = -200$. Since domestic saving is inadequate to finance both domestic investment and the government deficit, net exports must be negative in order to finance injections. Rearranging Equation (2.4), $G - T = S - (I + NX)$, then $NX = S - I - (G - T) = 1000 - 800 - 400 = -200$.

3. a. Consumers buy eight billion dollars from supermarkets, which is the amount oranges contribute to GDP. Consumers buy 18 billion dollars in orange juice from supermarkets and eight billion dollars in orange juice from restaurants. So orange juice contributes 26 billion dollars to GDP. Together, oranges and orange juice contribute 34 billion dollars to GDP.

   b. The value added by orange growers is 21 billion dollars, the value of the crops that they sold to orange juice processors and supermarkets. The value added by orange juice processors is three billion dollars which is the difference between what they sell orange juice to supermarkets for and what they pay orange growers for their oranges. The supermarkets add two billion dollars in value to oranges, which is the difference between what consumers pay to buy oranges from supermarkets and what supermarkets pay the oranges growers for the oranges. Supermarkets add four billion dollars to the value of orange juice, which is the difference between what they sell orange juice to consumers and restaurants for and the amount the supermarkets pay to the processors for the orange juice. So supermarkets add a total of six billion dollars to the value of output. Finally, restaurants add four billion dollars to the value of orange juice, which is the difference between what they sell orange juice to consumers and what restaurants pay to the supermarkets for the orange juice. The total of the values added by orange growers, orange juice processors, supermarkets, and restaurants

equals 21 + 3 + 6 + 4 = 34 billion dollars, which equals the combined value of oranges and orange juice purchased by consumers.

4. We are going to use the following information as given in the problem to find the solutions:

	Year 1	Year 2
1. Prices		
a. Automobiles	20,000	22,000
b. Fast PCs	3,000	700
2. Quantities		
a. Automobiles	1,000	1,000
b. Fast PCs	10,000	15,000
3. Current-dollar expenditures		
a. Automobiles	20,000,000	22,000,000
b. Fast PCs	30,000,000	10,500,000
c. Total: Nominal GDP	50,000,000	32,500,000
4. Constant-dollar expenditures		
a. At fixed year 1 prices	50,000,000	65,000,000
b. At fixed year 2 prices	29,000,000	32,500,000
5. Real GDP (index, year 1 = 1.00)		
a. At fixed year 1 prices	1.00	1.30
b. At fixed year 2 prices	1.00	1.12
c. Chain-weighted (geometric mean, 5.a and 5.b)	1.00	1.21
6. Additional indexes, year 1 = 1.00		
a. Nominal GDP	1.00	0.65
b. GDP deflator	100	53.72

a.

	Year 1	Year 2
Nominal GDP	50,000,000	32,500,000

	Year 1	Year 2
Constant-dollar expenditures		
i. At fixed year 1 prices	50,000,000	65,000,000
ii. At fixed year 2 prices	29,000,000	32,500,000

b.

	Year 1	Year 2
Real GDP (year 1 = 1.00)		
i. At fixed year 1 prices	1.00	1.30
ii. At fixed year 2 prices	1.00	1.12
iii. Chain-weighted (geometric mean)	1.00	1.21
The percentage change in real GDP is 21 percent.		

c.

	Year 1	Year 2
Nominal GDP	1.00	0.65
Implicit GDP Deflator	100	53.72

5. The implicit GDP deflator equals nominal GDP/real GDP × 100 = 10,608/10,400 × 100 = 102.
6. Nominal GDP equals real GDP when the implicit GDP deflator equals one. Therefore, nominal GDP = 10,000.
7. Since the GDP deflator equals nominal GDP/real GDP × 100, real GDP equals nominal GDP/GDP deflator × 100. Therefore, real GDP equals 11,200/102.5 × 100 = 10,926.8.
8. These answers use the formula given in the boxed material on page 41 to calculate the percentage annual growth rates.

   a. The growth rate of labor productivity between the first quarters of 1973 and 1996 equals 100 × (LN(75.4/54.0)/23) = 1.45 percent.

   The growth rate of labor productivity between the first quarters of 1996 and 2007 equals 100 × (LN(111.0/75.4)/14) = 2.76 percent.

   Since productivity growth is a measure of how fast living standards are rising, this shows that they rose about 90 percent faster between 1996 and 2010 than they did from 1973 through 1995.

   b. The rate of inflation between 1974 and 1979 equals 100 × (LN(43.8/30.7)/5) = 7.10 percent.

   The rate of inflation between 1979 and 1984 equals 100 × (LN(59.8/43.8)/5) = 6.23 percent.

   The rate of inflation between 1984 and 1989 equals 100 × (LN(69.5/59.8)/5) = 3.01 percent.

   The rate of inflation between 1989 and 1994 equals 100 × (LN(79.9/69.5)/5) = 2.79 percent.

   The rate of inflation between 1994 and 1999 equals 100 × (LN(86.8/79.9)/5) = 1.66 percent.

   The rate of inflation between 1999 and 2004 equals 100 × (LN(96.8/86.8)/5) = 2.18 percent.

   The rate of inflation between 2004 and 2009 equals 100 × (LN(109.6/96.8)/5) = 2.48 percent.

   The rate of inflation was highest between 1974 and 1979 and lowest between 1994 and 1999. In addition, there was a steady decline in the rate of inflation over the last quarter of the twentieth century. The rate of inflation then started to increase during the first decade of the twenty-first century.

   c. The annual growth rate of real GDP from the second quarter of 2005 through the second quarter of 2006 equals 100 × (LN(12,962.5/12,587.5)) = 2.94 percent.

   The annual growth rate of real GDP between the second and third quarters of 2006 equals 100 × 100 × (LN(12,965.9/12,962.5)/.25) = .10 percent.

These results indicate that on an annual basis, real GDP rose only one-thirtieth as fast between the second and third quarters of 2006 than it did between the second quarters of 2005 and 2006.

9. From the general formula to calculate the percentage annual growth rate (see *Box*: "How to Calculate Inflation, Real GDP Growth, or Any Other Growth Rate"), the growth rate is $x_t = 100 \text{ LN}(X_t/X_{t-s})/s$, where X_{t-s} is initial real GDP and X_t is final real GDP. Hence, the number of years is $s_t = 100 \text{ LN}(X_t/X_{t-s})/x_t$.

   The doubling of real GDP means $X_t/X_{t-s} = 2$ and 100 LN(2) = 69.31 approximately.

   a. s = 69.31/4 = 17.3 or 18 years
   b. s = 69.31/6 = 11.6 or 12 years
   c. s = 69.31/8 = 8.7 or 9 years

10. The formula for the unemployment rate is given by the formula on page 43. In 2009, the unemployment rate was 14,265,000/(139,877,000 + 14,265,000) × 100 = 9.3 percent.