

**SOLUTIONS MANUAL**

A black spiral-bound notebook is shown from a slightly elevated perspective. The spiral binding is on the left side. The cover of the notebook is black and features the text "IMAGE COMING SOON" in large, white, bold, sans-serif capital letters, centered on the cover.

**IMAGE  
COMING  
SOON**

## CHAPTER 2

# Measuring the Macroeconomy

### OVERVIEW

Gross domestic product (GDP), the market value of all final goods and services produced in an economy during a calendar year, along with the other national income accounts from which it comes, provides a national pulse that allows us to evaluate the health of our national economy. During the last thirty years, despite a few recessions, the U.S. economy has experienced relatively stable growth, averaging just over 3 percent per year. During that same time period, consumption's share of GDP has grown by about 4 percentage points, while the share of government purchases (but not government spending) declined by about the same amount. While not a perfect measure, GDP per capita does allow us to track the average living standard of people in a country, but it fails to account for household production, people's health, and environmental impact. In the United States, GDP per capita rose an average of 2.3 percent during the last half of the twentieth century. The actual increase in living standards may be higher or lower than the change in GDP per capita would suggest, depending on the contributions of household production, people's health, and environmental changes. Further complicating GDP comparisons over time is the change in relative prices that occurs among different products. Using the Fisher index to update price changes each year through a chain-weighting process produces the most accurate representation of GDP changes over time. Making international comparisons, however, requires additional care. In addition to having to account for the use of different currencies, we also need to account for differences in local currency purchasing power but in different countries. To do this we use a set of common world prices.

### KEY CONCEPTS

*National income accounting* provides a systematic measure of aggregate economic activity. In fact, it provides three ways to produce the same final value for gross domestic product: expenditures, income, and production or value-added.

*Gross domestic product (GDP)* is the key overall measure of economic activity in an economy. It consists of the value of all goods and services produced during a calendar year for which there have been legal market transactions. As a measure of all productive activity, however, it suffers from the omission of household production and underground or black market activities. It also fails to account for certain health and environmental issues.

The *income approach to national income accounting* recognizes that every dollar of goods and services produced must also generate a combined dollar's worth of income for each of the factors of a product's production (rent from land and resource usage, wages from labor, interest from capital, and profit from entrepreneurship). A useful application of the income approach is to divide income into two categories: one for labor income (wages and the labor part of profit) and one for the income received by the owners of all other productive resources (rent for land, interest for capital, and the capital part of profit).

The *expenditure approach to national income accounting* assigns all spending to one of four categories: consumption, investment, government purchases, and the

foreign sector; and since for accounting purposes firms essentially purchase their unsold inventory each year and then sell it in the following year, the sum of these categories generates total spending or GDP for the year, that is,  $Y = C + I + G + NX$ .

The *production approach to national income accounting* considers the value added by each producer at each stage of production. This method emphasizes the contribution toward GDP of each of the participants in the production process. The sum of “value added” at each stage of production necessarily equals the final value of the product when sold on completion.

*Labor’s share of GDP*, wages and the labor part of profit, has remained relatively stable over time at about two thirds of total production according to the income approach to national income accounting.

*Real GDP* is the concept used to measure the real—physical or actual—production of goods and services in the absence of price changes. It allows us to answer questions about the growth of an economy. For example, did the United States produce more actual goods and services during 2006 than during 2005?

*Nominal GDP* uses current prices from the year in question and refers to the actual or face value of the total sales generating GDP during that year.

*Chain weighting* is a method of calculating real GDP that generates a more accurate calculation of growth between years than if we used either of the individual years of the comparison period as the base year. It assumes that price growth for a period is midway between the rates suggested by either of the years in question. Thus, we gradually update the prices used to make comparisons by averaging the results of the prices for each of the adjacent years individually, then repeat the process for each pair of adjacent years in the entire period (that is, we use the *Fisher* index and average the results of the *Laspeyres* index, beginning year prices, and the *Paasche* index, final year prices, for each pair of prices for the entire GDP series).

The *unemployment rate* tells us the percentage of people formally looking for employment who are unable to find jobs. It is discussed further in Chapter 7.

The *interest rate* is the price you pay for using someone else’s resources today. It can take the form of either goods, services, or money and compensates the owner of those resources for waiting to use them themselves while you use them. Interest rates are discussed further in Chapter 8.

The *inflation rate* is the percentage change in the price level and also receives further discussion in Chapter 8.

An *exchange rate* is the price of one country’s currency in terms of another country’s currency. For example, the price of a dollar might be 7.7 yuan, in which case the exchange rate is 7.7 yuan, per dollar (or 13 cents per yuan). Exchange rates are discussed further in Chapter 15.

*International comparisons of GDP* present us with the difficulty of comparing two countries that not only have different currencies, but whose currencies also have different degrees of purchasing power even once the exchange rate has been taken into account. Therefore, to make meaningful international comparisons, we must first make the conversion to a common currency, then take into account differences in purchasing power by converting each country’s GDP to a common set of prices.

### TRUE/FALSE QUESTIONS

1. National income accounting provides useful short-term snapshots of a nation’s economic activity that provide meaningful insights into its growth over time but are of relatively little use in making international comparisons.
2. As shares of GDP, its components—consumption, investment, government purchases, and net exports—are ranked here in order of their size.
3. Since before the Great Depression, consumption has played a significant role in the economy consistently comprising two thirds of GDP.
4. During World War II, government purchases accounted for more than twice their usual percentage of GDP.
5. Economists use the term *capital* to refer to the money necessary to establish and begin operating a new business venture.
6. Roughly fifty cents from every dollar of sales in the United States goes to the owners of capital.
7. The net operating surplus of a business is just another name for profit.
8. National income accounting data provide support for the claim that corporations are not getting richer at the expense of labor.
9. GDP includes all goods and services produced in an economy during a calendar year.
10. The sale of a used car adds to the value of GDP.
11. GDP comparison between years is best accomplished using nominal GDP.

**MULTIPLE-CHOICE QUESTIONS**

1. The national income and product accounts provide a systematic method for aggregating all of the following areas of economic activity except
  - a. the production of automobiles.
  - b. the provision of health care services.
  - c. music distributed over the Internet.
  - d. the distribution of computer software and hardware.
  - e. None of the above.
2. When a firm earns “economic profits,” we can safely argue that
  - a. the firm is breaking even.
  - b. the entrepreneurs (Homer and Marge in the text) have earned their opportunity cost.
  - c. the entrepreneurs are earning a normal competitive return from their enterprise.
  - d. the entrepreneurs are earning an above normal return from their enterprise.
  - e. None of the above.
3. If a firm experiences at least some degree of market power, even if only a little, then
  - a. economic profits will be positive.
  - b. accounting profits will exceed economic profits.
  - c. price will exceed marginal revenue.
  - d. price will exceed marginal cost.
  - e. both a and d are correct.
4. GDP includes each of the following except
  - a. consumption.
  - b. government.
  - c. foreign exchange.
  - d. investment.
  - e. none of the above.
5. Consumption expenditures include each of the following categories except
  - a. automobiles.
  - b. medical care.
  - c. entertainment.
  - d. new home construction.
  - e. food.
6. Government purchases of goods and services at all levels of government in the United States includes each of the following except
  - a. spending on public schools.
  - b. military expenditures.
  - c. spending on Medicare.
  - d. research by the National Science Foundation.
  - e. spending on highway construction.
7. Another name for net exports is
  - a. imports minus exports.
  - b. exports plus imports.
  - c. foreign exchange.
  - d. trade balance.
  - e. foreign trade.
8. Which of the following does not help explain the recent increase in consumption spending as a share of GDP?
  - a. decreased government spending
  - b. falling trade balances
  - c. increased credit availability
  - d. positive technology shock
  - e. None of the above; they all help to explain it.
9. Labor’s share of national income is approximately
  - a. 75 percent.
  - b. 67 percent.
  - c. 60 percent.
  - d. 57 percent.
  - e. 50 percent.
10. The production approach to national income accounting uses which of the following methodologies?
  - a. expenditures
  - b. income
  - c. consumption
  - d. value-added
  - e. factors of production
11. Our current measure of GDP, as valuable as it is in measuring the performance of our economy suffers from several limitations. Which of the following is not one of them?
  - a. the exclusion of household production
  - b. the presence of an underground economy
  - c. the impact of the Clean Air Act on U.S. economic activity
  - d. the increased life expectancy of U.S. citizens
  - e. the impact of global warming generated by U.S. economic activities
12. What is the appropriate relationship between nominal and real GDP?
  - a.  $\text{real GDP} = \text{nominal GDP} - \text{price level}$
  - b.  $\text{nominal GDP} = \text{real GDP} \div \text{price level}$
  - c.  $\text{nominal GDP} = \text{real GDP} + \text{price level}$
  - d.  $\text{real GDP} = \text{nominal GDP} \div \text{price level}$
  - e.  $\text{real GDP} = \text{nominal GDP} \times \text{price level}$
13. Which of the following is not one of the difficulties in measuring GDP changes over time?
  - a. Quantities produced have changed; prices have not.
  - b. Prices have changed; quantities produced have not.
  - c. Both prices and quantities produced have changed.
  - d. The existence of an underground economy.
  - e. Changes in the quality of the goods produced.

14. The most accurate method of portraying the change in real GDP over time uses the
  - a. Paasche index.
  - b. Laspeyres index.
  - c. Fisher index.
  - d. an average of the Fisher and Laspeyres indices.
  - e. BOTH c and d.
15. Economists generally prefer the chain-weighted procedure employed by the Fisher index because it
  - a. reduces distortions caused by high inflation.
  - b. provides better comparisons of GDP over longer periods of time.
  - c. provides a more accurate portrayal of changes in living standards over time.
  - d. provides a more accurate portrayal of real GDP changes over time.
  - e. all of the above.
16. When determining any particular component's share in GDP, for example, consumption's share in GDP during a given year, it is best to use \_\_\_\_\_ values.
  - a. Paasche
  - b. Laspeyres
  - c. Fisher
  - d. nominal
  - e. real
17. When comparing economic performance across countries, key considerations include all of the following except
  - a. currency conversion among different countries.
  - b. different prices for the same good or service in different countries.
  - c. local prices in each country.
  - d. unemployment in each country.
  - e. real GDP in each country.
18. When comparing economic performance across countries, we observe all of the following except
  - a. low-wage countries generally have many goods that sell for lower prices than their high-wage counterparts.
  - b. international GDP comparisons based on common prices are less accurate.
  - c. local services in poor countries generally cost less than local services in rich countries.
  - d. international GDP comparisons based on exchange rates are inferior to common price comparisons.
  - e. rich countries generally have higher price levels.

## EXERCISES

These exercises will give you practice determining which types of productive activities are included in the calculations that provide GDP estimates.

1. Which of the following are included when estimating GDP?
  - a. flour sold to the bakery at the local grocery store
  - b. tires sold to General Motors
  - c. a purchase of Wal-Mart stock in the stock market
  - d. flour sold to a customer at the grocery store
  - e. tires sold to the university you attend
  - f. household production (laundry, cooking, etc.)
  - g. a car purchased from a national rental car agency
  - h. the sale of a new home
  - i. Temporary Assistance to Needy Families (TANF)
  - j. laundry services at the dry cleaner
  - k. drug trafficking and other illegal services
  - l. sale of an existing home
  - m. interest payments on the national debt
  - n. haircut in a salon
  - o. rental value of owner-occupied housing
2. Based on your work in Exercise 1, what inferences can you make regarding the accuracy of current GDP estimates for the United States?

## PROBLEMS

### Worked Problem

This problem takes you step by step through the process of generating both nominal and real GDP figures for a simple two-good economy. Note as you begin work on it that it is designed to show real GDP growth between the years 2008 and 2009 but no growth in real GDP, between the years 2009 and 2010. You will find that nominal GDP therefore behaves differently than real GDP, as expected between 2008 and 2009 but perhaps unexpectedly between 2009 and 2010. This problem also provides additional practice calculating growth rates, and it provides the opportunity to get a feeling for the process involved in generating a chain-weighted GDP series.

1. Consider the following table describing a hypothetical economy that produces only DVDs and TVs. Fill in the missing elements using the growth rate formula,

$$g_x = \left( \frac{x_t - x_{t-n}}{x_{t-n}} \right), \text{ (in this problem } n = 1 \text{) for the}$$

percentage change in all but the last row, where the

formula for chained prices is  $\sqrt{\frac{x_t^{10}}{x_{t-1}^{10}} \cdot \frac{x_t^{09}}{x_{t-1}^{09}}} - 1$ . Note

that in this formula the ratio involving the  $x^{09}$  values represents the first year or *Laspeyres index* value and the ratio with the  $x^{10}$  values represents the *Paasche index* value of the *Fisher index* average. The use of the radical sign makes this a geometric average, which is appropriate for determining growth rates because it more accurately allows for different yearly growth rates.

	2008	2009	2010	Percent Change	
				2008–09	2009–10
Quantity of DVDs	200	225	225	<b>A</b>	0%
Quantity of TVs	10	12	12	20%	<b>B</b>
Price of DVDs (dollars)	20	20	20	0%	0%
Price of TVs (dollars)	1200	1100	1000	<b>C</b>	–9%
Nominal GDP	<b>D</b>	17700	16500	<b>E</b>	<b>F</b>
Real GDP in 2008 prices	16000	<b>G</b>	18900	18.13%	0%
Real GDP in 2009 prices	<b>H</b>	17700	<b>I</b>	18.00%	0%
Real GDP in 2010 prices	<b>J</b>	16500	16500	17.86%	0%
Real GDP in chained prices, benchmarked to 2010	<b>K</b>	16500	16500	<b>L</b>	0%

- a. Calculate the value of cell A. This cell calculates the growth in the number of DVDs sold in the year 2009 relative to the year 2008 as follows:

$$\left(\frac{225 - 200}{200}\right) = 0.125 \text{ or } 12.5\%.$$

- b. Calculate the value of cell B. This cell calculates the growth in TV sales in the year 2010 relative to the year 2009 as in part a for DVDs:

$$\left(\frac{12 - 12}{12}\right) = 0 \text{ or } 0\%.$$

- c. Calculate the value of cell C. This cell calculates the growth or percentage change in the price of TVs between 2008 and 2009:

$$\left(\frac{1100 - 1200}{1200}\right) = -0.083 \text{ or } -8.3\%.$$

- d. Calculate the value of cell D. This cell calculates nominal GDP for the year 2008, which is the sum of price  $\times$  quantity for both DVDs and TVs:  $(200 \bullet 20) + (10 \bullet 1200) = 1600$ .
- e. Calculate the value of cell E. This cell calculates the growth or percentage change in nominal GDP between 2008 and 2009:

$$\left(\frac{17700 - 16000}{16000}\right) = 0.1063 \text{ or } 10.63\%.$$

- f. Calculate the value of cell F. This cell calculates the growth rate of nominal GDP between the years 2009 and 2010:

$$\left(\frac{16,500 - 17,700}{17,700}\right) = -0.0678 \text{ or } -6.78\%.$$

- g. Calculate the value of cell G. This calculates the value of real GDP in 2009 using 2008 prices, that is, using the *Laspeyres* method:  $(225 \bullet 20) + (12 \bullet 1200) = 18,900$ .
- h. Calculate the value of cell H. This cell calculates the value of real GDP in 2008 using 2009 prices, that is, using the *Paasche* method:  $(200 \bullet 20) + (10 \bullet 1100) = 15,000$ .
- i. Calculate the value of cell I. This cell calculates the value of real GDP in 2010 using 2009 prices, that is, using the *Laspeyres* method:  $(225 \bullet 20) + (12 \bullet 1100) = 17,700$ .
- j. Calculate the value of cell J. This cell calculates the value of real GDP in 2008 using 2010 prices, that is, using the *Paasche* method:  $(200 \bullet 20) + (10 \bullet 1000) = 14,000$ .
- k. Calculate the value of cell K. K is the value of real GDP in year 2008 necessary to generate a real GDP of 16,500 in year 2009 for chained GDP benchmarked to the year 2010. Therefore, it is necessary to work backward and calculate the value for cell L but stop just short of making it a growth rate by subtracting 1. Note that the number you get

$$\text{for } \sqrt{\frac{16500}{14000} \bullet \frac{17700}{15000}} \text{ is approximately } 1.1793.$$

Hence, dividing 16,500 by 1.1793 reduces its value to 13,992.

- l. Calculate the value of cell L. L is the growth rate of the geometric average of changes between 2008 and 2009 using prices from 2009 and 2010. Cell L calculates the growth rate of real GDP between 2008 and 2009 indexed to the year 2010:

$$\sqrt{\frac{16500}{14000} \bullet \frac{17700}{15000}} - 1 = 0.1793 \text{ or } 17.93\%.$$

- m. Explain the difference in behavior between nominal and real GDP in this example? Real growth exceeds nominal growth because

the price of technology (TVs) has fallen. Nominal growth would grossly understate the real level of activity in the economy.

- n. What is the relationship between real GDP growth using 2009 and 2010 prices and real GDP growth using the chained prices benchmarked to 2010? Chained real GDP is an average of real GDP derived using constant prices. Note that 17.93 percent is an average of 18.00 percent and 17.86 percent.
2. Comparing another country to the United States. Consider Mexico. Mexican GDP in the year 2000 was approximately 5.5 trillion pesos. U.S. GDP that year was approximately \$9.82 trillion. The dollar exchanged for 9.46 pesos. Converted to U.S. dollars, the price level in Mexico relative to the price level in the United States was 0.6079.
    - a. Approximately how much would a dollar's worth of products in the United States cost in Mexico?
    - b. How large is the Mexican economy relative to the U.S. economy if we just use the exchange rate to make that comparison?
    - c. Alternatively, how much larger is the U.S. economy than the Mexican economy?
    - d. How large is the Mexican economy relative to the U.S. economy if we use common prices?
    - e. Again, using common prices, how much larger is the U.S. economy than the Mexican economy?
    - f. What can account for the differences between these comparisons?
  3. Suppose that an earthen dam breaks, flooding downstream communities, damaging or destroying hundreds of millions of dollars worth of homes and businesses in addition to any recreational and environmental impact. See [en.wikipedia.org/wiki/Teton\\_Dam](http://en.wikipedia.org/wiki/Teton_Dam) for an actual example of such an occurrence. Note that this problem is more about the approach to and methodology of accounting for GDP than about any specific numbers that might be generated.
    - a. Visit the accompanying Wikipedia entry and determine approximately what measurable impact on GDP the Teton Dam disaster generated. What estimate can you provide?
    - b. What would the impact on GDP be if the construction costs also were included?
    - c. Would you want to include only explicit construction costs in this estimate?
    - d. What welfare impact did the residents of the downstream communities of Rexburg, Wilford, Sugar City, Salem, and Hibbard experience as a result of this increase in GDP?
    - e. How accurately does the GDP increment from part a reflect the welfare changes experienced in Idaho as a result of this disaster?

## CHAPTER 2 SOLUTIONS

### True/False Questions

1. False. While the first two elements of the statement (about snapshots and growth) are correct, the third part (about international comparisons) is not. See Section 2.1.
2. False. See Table 2.1. Government purchases traditionally have been a larger share of GDP than investment. However, in the early 2000s, the two have been approaching parity.
3. False. See Figure 2.1. *Consistently* is the term that makes this statement false. Consumption has varied from over 80 percent (1931–33) to less than 50 percent (1943–44). In one sense though, the statement can be true, since consumption averaged 67 percent for the period 1929–2005.
4. True. See Figure 2.1. Government purchases, usually around 20 percent exceeded 40 percent of GDP during 1942–45.
5. False. See Section 2.2. For economists, capital refers to inputs into the production process such as buildings and computers, and often is referred to as *capital stock*. In finance and business, the term *capital* is used to refer to the money or funding used to acquire the things economists designate as capital stock.
6. False. See Section 2.2 and Figure 2.3. Labor's share of GDP is approximately two thirds and owners of capital receive the other third.
7. True. See Section 2.2.
8. True. See Section 2.2. Note that reaching this conclusion requires splitting up profit or the net operating surplus of business between its labor and capital income components.
9. False. GDP includes all of the *final* goods and services produced in an economy during a calendar year. Including all goods and services would include intermediate goods and generate a double counting problem. See Section 2.2.
10. True. But not the entire sales price, only the dealer's profit that gets treated as a service. See Section 2.2.
11. False. Real GDP should be used to make between year comparisons since it adjusts for price level changes over time. See 2.3, "A Simple Example: Where Real GDP Doesn't Change."

**Multiple-Choice Questions**

- e, none of the above. National income accounting incorporates each of these activities in its estimates of overall economic activity. See Section 2.1.
- d, the entrepreneurs are earning an above normal return. See Section 2.2.
- e, both a and d are correct. Profit maximization requires  $MR = MC$ . In long-run equilibrium for a competitive firm, there is no economic profit. For economic profit to exist, price must exceed marginal cost in the short run. In a competitive industry, the existence of  $P > MC$  generally signals the opportunity for entry to other entrepreneurs.
- c, foreign exchange. Foreign exchange is the market for exchanging currencies between countries. Net exports are the missing component of GDP in this question.
- d, new home construction. This is a component of investment (residential). See Section 2.2.
- c, spending on Medicare. This is a transfer payment. See Section 2.2.
- d, trade balance. Net exports equals exports minus imports, or the *trade balance*. See Section 2.2.
- e, none of the above. See the end of Section 2.2 for a discussion to that end.
- b, 67 percent. See Section 2.2 and Figure 2.3.
- d, value-added. This approach keeps track of the “value added” at each stage of the production process. See Section 2.2.
- c, the impact of the Clean Air Act on U.S. economic activity. These costs will be reflected in firms’s cost of doing business, and therefore, their influence will be felt on the value of GDP.
- d, Real GDP = nominal GDP  $\div$  price level. Recall that the NGDP = PL  $\times$  RGDP. See Section 2.3.
- a, quantities produced have changed; prices have not. If prices never changed comparing production between years would be much simpler because we would know that any changes derived only from different quantity levels. See Section 2.3.
- c, the Fisher index, because it averages the Paasche and Laspeyres indices. See Section 2.3.
- e, all of the above. See Section 2.3.
- d, nominal values, because all the values being compared will have occurred during the same year. See Section 2.3.
- d, while important, unemployment is not necessary for the conversion and comparison of GDP figures between countries.
- b, GDP comparisons based on common prices are *more* accurate. See Section 2.4.

**Exercises**

- Answers d, e, h, j, n, o are correct because each of them is a *final* good or service and does not become part a product that is subsequently resold.  
The other answers are incorrect for these reasons: a and b are intermediate goods; c is a transfer of ownership, nothing is produced; f contains no market transaction, even though production took place; g, a used car, was counted in GDP when it was acquired by the car rental agency; i is an income transfer, not a market transaction, facilitated purchases will be counted at the time of sale; k are illegal transactions, part of the underground economy, no market transactions are reported; l, a used home, was counted in GDP when it was new; m, an income transfer, not a market transaction, facilitated purchases will be counted at the time of sale. Note that the commissions for both the sale of the used car and the existing home will be counted towards GDP because of the service they provided during the calendar year of the sale.
- At a minimum, we must conclude that official GDP estimates understate the level of production occurring in the United States, both for legal and illegal reasons. Specifically, in the legal realm, neither household production nor bartered transactions are included and none of the illegal production is included.

**Problems**

- Worked Exercise. Answers are given in the exercise.
- Using the conversion factor of the Mexican to U.S. price level, we know that a dollar’s worth of products in the United States would cost approximately 61¢, or 5.7 pesos ( $0.6079 \times 9.46$ ) in Mexico.
  - The Mexican economy in the year 2000 was 5.92 percent of the U.S. economy. First, convert the pesos to dollars then make the ratio between Mexico and the United States:
 
$$\left( \frac{5.5 \text{ tr pesos} / 9.46}{9.82 \text{ tr dollars}} \right) = \frac{0.581395}{9.82} = 0.059205 \text{ or } 5.92\%$$
- Inverting the fraction of the U.S. economy that Mexico is generates the order of magnitude that the United States is larger than Mexico. In other words,



the U.S. economy is almost seventeen times larger than the Mexican economy:  $\left(\frac{1}{0.0592} = 16.89\right)$ .

- d. Using common prices to further adjust the peso to dollar conversion, the Mexican economy in the year 2000 was 9.74 percent the size of the U.S. economy:

$$\left(\frac{\frac{5.5 \text{ tr pesos}}{9.46}}{\frac{0.6079}{9.82 \text{ tr dollars}}}\right) = \frac{0.956399}{9.82} = 0.097393 \text{ or } 9.74\%$$

- e. Using common prices, the U.S. economy is at least ten times larger than the Mexican economy

$$\left(\frac{1}{0.097393} = 10.267678\right) \text{ or } 10.27.$$

- f. The difference in local purchasing power of each nation's currency accounts for the difference between 17 in part c and 10 in part e.
3. a. The Wikipedia website indicates that approximately \$300 million worth of claims were paid by the federal government. If we make the assumption that all the payments actually went to replacing and rebuilding previous possessions and structures, then we could argue that GDP increased by the amount of the payments made by the federal government.
- b. Including the explicit construction costs would raise the estimated impact on GDP to \$400 million.

- c. No. If we consider the subsequent expenditures on goods and services caused by the increased earnings directly attributable to the construction and later to the reparations of the Teton Dam, then the impact on GDP could be considerably larger. But, even then, we would not have accounted for the many hours of unpaid labor (a form of household production) that both the people who directly suffered losses and the thousands of people who volunteered in the cleanup efforts contributed to producing the output of flood cleanup. We can see that including only explicit construction costs significantly understates the impact on GDP were all the market and nonmarket impact accounted for.
- d. A numerical solution to this question also is quite difficult to generate. Initially, we might estimate the value of their losses and subtract it from the increment in GDP and determine whether or not the difference was positive or negative. This, however, would not account for the entire impact on their welfare. Were they healthier afterward compared to before the disaster? How was the quality of their environment affected? How much was their welfare affected by the losses that were irreplaceable?
- e. While we can generate a figure for new goods and services produced to replace the losses associated with the Teton Dam disaster, we must concede that this value significantly understates the total impact of the event.