

NATIONAL INCOME ACCOUNTING

FUNDAMENTAL QUESTIONS

1. How is the total output of an economy measured?

Suppose you read an article in the financial section of today's newspaper in which the president argues that the Federal Reserve should lower interest rates because of recent slow growth in the economy. How did the president know that the economy was growing slowly?

We want to be able to compare the condition of the economy across different points in time and also against the economies of other countries. How can we tell whether the economy is better or worse than before? If we are producing more goods and services than before, the economy is growing. In order to combine dissimilar items like apples and oranges, economists use the market value of goods and services. The **gross domestic product (GDP)** is the market value of all final goods and services produced in a year in a country. We use final goods and services to avoid double-counting. If a tire is to be sold directly to a consumer, the value of the tire is included in the GDP. But if the tire is sold as part of an automobile, its value is already included in the value of the automobile, so we do not count it separately.

2. Who produces the nation's goods and services?

Economists divide domestic producers into three categories: households, businesses, and the government. Business firms produce the largest part of the U.S. GDP.

3. Who purchases the goods and services produced?

The groups that purchase the GDP are households, businesses, government, and the international sector. Household spending is called *consumption*; business spending is called *investment*; *government spending* is spending by the government for goods and services; and spending by the international component is called *net exports*. In the United States, households are the largest purchasers of goods and services. A shorthand way of expressing the GDP as the sum of expenditures is $GDP = C + I + G + X$.

4. Who receives the income from the production of goods and services?

Income is received by the factors of production, which economists divide into three categories: real property, labor, and capital. The payment to real property is called *rent*, the payment to labor is called *wages*, and the payment to capital is called *interest*. *Profits* are the sum of corporate profits plus profits from sole proprietorships and partnerships. Two income categories that are not payments to the factors of production are included in the GDP: **capital consumption allowance** and **indirect business taxes**. For GDP as output to be equal to GDP as income, we

must include all the expenses producers incur in the production of output. A shorthand way to write GDP as income is $GDP = \text{wages} + \text{interest} + \text{rent} + \text{profit} - \text{net factor income from abroad} + \text{capital consumption allowance} + \text{indirect business taxes}$. (We subtract net factor income from abroad since U.S. GDP refers only to income earned within U.S. borders.)

5. What is the difference between nominal and real GDP?

Nominal GDP measures output in terms of its current dollar value. A rise in nominal GDP can be from an increase in physical goods and services, a rise in prices, or both. **Real GDP** measures output in constant prices. Real GDP can only increase if the production of physical goods and services increases. Real GDP is thus a better indicator of economic activity than nominal GDP.

6. What is a price index?

A **price index** measures the level of average prices and shows how prices, on average, have changed. If a pair of running shoes costs \$75 this year, then 10 pairs of running shoes have a market value of \$750. If the same shoes cost \$80 next year, then 10 pairs have a market value of \$800. The nominal value has increased, but we still have only 10 pairs of running shoes. A price index adjusts nominal values for price changes.

Key Terms

national income accounting
gross domestic product (GDP)
intermediate good
value added
inventory
capital consumption allowance
depreciation
indirect business tax
gross national product (GNP)

net national product (NNP)
gross investment
net investment
national income (NI)
personal income (PI)
transfer payment
disposable personal income (DPI)
nominal GDP

real GDP
price index
base year
chain-type real GDP growth
GDP price index
consumer price index (CPI)
cost of living adjustment (COLA)
producer price index (PPI)

Quick-Check Quiz

Section 1: Measures of Output and Income

1. Gross domestic product is
 - a. the market value of all goods and services produced in the United States in a year.
 - b. the market value of all final goods and services produced in a year.
 - c. the market value of all final goods and services produced in a year within a country's borders.
 - d. the market value of all final goods and services sold in a year.
 - e. the total number of final goods and services produced in a year by domestic resources.

2. GDP as expenditures can be expressed as
 - a. $C + I + G + X$.
 - b. wages + interest + rent + profits - net factor income from abroad + capital consumption allowance + indirect business taxes.
 - c. the sum of the values added at each stage of production.
 - d. NI + indirect business taxes.
 - e. NI + capital consumption allowance.

3. Which of the following is incorrect?
 - a. $PI = DPI - \text{personal taxes}$
 - b. $GDP = GNP - \text{net factor income from abroad}$
 - c. $DPI = PI - \text{personal taxes}$
 - d. $NI = NNP - \text{indirect business taxes}$
 - e. $NNP = GNP - \text{capital consumption allowance}$

4. Unplanned inventory
 - a. is a cushion above expected sales.
 - b. is gross investment - capital consumption allowance.
 - c. is the difference between the value of the output and the value of the intermediate goods used in the production of that output.
 - d. is unsold goods that the firm had expected to be able to sell during the year they were produced.
 - e. is the market value of the goods and services produced by a firm in one year.

5. The largest component of total expenditures is
 - a. consumption.
 - b. investment.
 - c. government spending.
 - d. net exports.
 - e. rent.

6. To get disposable personal income from GNP, we must subtract all of the following except
 - a. indirect business taxes.
 - b. net factor income from abroad.
 - c. capital consumption allowance.
 - d. income earned but not received.
 - e. personal taxes.

7. To get NNP from GNP, we subtract
 - a. capital consumption allowance.
 - b. net factor income from abroad.
 - c. capital consumption allowance and indirect business taxes.
 - d. capital consumption allowance, indirect business taxes, and personal taxes.
 - e. capital consumption allowance, indirect business taxes, net transfer payments, and personal taxes.

8. National income equals
 - a. GNP – capital consumption allowance.
 - b. GNP – net factor income from abroad.
 - c. GNP – capital consumption allowance – indirect business taxes.
 - d. NNP – indirect business taxes.
 - e. Both c and d above are correct.

9. Which of the following is a transfer payment?
 - a. profits that are retained by corporations rather than paid out to stockholders
 - b. social security benefits
 - c. FICA taxes
 - d. estimated in-kind wages
 - e. barter and cash transactions in the underground economy

10. Which of the following is counted in the GDP?
 - a. the value of homemaker services
 - b. estimated illegal drug transactions
 - c. the value of oil used in the production of gasoline
 - d. estimated in-kind wages
 - e. the sale of a used automatic dishwasher

11. For a hypothetical economy in a given year, GDP equaled \$1,895, investment equaled \$303, goods exported equaled \$110, government spending equaled \$110, goods imported equaled \$167, and indirect business taxes equaled \$565. What was consumption equal to?
 - a. \$1,539
 - b. \$640
 - c. \$1,205
 - d. -\$57
 - e. It cannot be determined from the information given.

Section 2: Nominal and Real Measures

1. Nominal GDP
 - a. is real GDP divided by the price level.
 - b. measures output in constant prices.
 - c. decreases when the price level increases.
 - d. measures output in terms of its current dollar value.
 - e. is real GDP divided by the consumer price index.

2. In calculating chain-type real GDP growth, economists first calculate growth rates using both beginning and ending year prices. then find real GDP growth by
 - a. adding the two growth rates together.
 - b. using the larger of the two growth rates.
 - c. finding the difference between the two growth rates.
 - d. finding the arithmetic mean of the two growth rates.
 - e. finding the geometric mean of the two growth rates.

3. The producer price index (PPI)
 - a. is the price index given by the ratio of nominal GDP to real GDP.
 - b. measures the average price of consumer goods and services that a typical household purchases.
 - c. measures average prices received by producers.
 - d. was originally known as the COLA.
 - e. is used to get real GDP from nominal GDP.

4. The real GDP
 - a. is calculated by multiplying the GDP price index by nominal GDP.
 - b. measures the average level of prices in the economy and shows, on average, how prices have changed.
 - c. measures output in constant prices.
 - d. is calculated by dividing nominal GDP by the CPI.
 - e. is calculated by dividing nominal GDP by the PPI.

5. A price index equal to 90 in a given year
 - a. indicates that prices were lower than prices in the base year.
 - b. indicates that the year in question was a year previous to the base year.
 - c. indicates that prices were 10 percent higher than prices in the base year.
 - d. is inaccurate—price indexes cannot be lower than 100.
 - e. indicates that real GDP was lower than GDP in the base year.

6. Social security payments are tied to the
 - a. GDP price index.
 - b. CPI.
 - c. PPI.
 - d. wholesale price index.
 - e. nominal GDP.

7. The current price for a T-shirt with a particular college logo is \$19.95, and the base-year price is \$12.95. The value of the price index for the current year is approximately
 - a. 54.
 - b. 65.
 - c. 165.
 - d. 154.
 - e. 135.

Section 3: Flows of Income and Expenditures

1. Total expenditures on final goods and services
 - a. equal NNP.
 - b. equal the total value of goods and services produced.
 - c. equal total income from selling goods and services.
 - d. All of the above are correct.
 - e. Only b and c are correct.

Practice Questions and Problems

Section 1: Measures of Output and Income

- Gross domestic product is the _____ value of all _____ goods and services produced in a year within a country's borders.
- _____ are goods that are used in the production of a final product.
- _____ is the difference between the value of output and the value of the intermediate goods used in the production of that output.
- _____ is a firm's stock of unsold goods.
- The estimated value of capital goods used up or worn out in a year plus the value of accidental damage to capital goods is called _____, or depreciation.
- Excise taxes and sales taxes are forms of _____.
- List the three factors of production and the name of the payments each factor receives. What additional four items must be figured in to find gross domestic product?

- GNP minus net factor income from abroad yields _____.
- A lei maker buys flowers from a nursery for \$125. She makes 50 leis from the flowers and sells each lei for \$3.99. What is the value added for the lei maker? _____
- A Kansas farmer sells wheat to a craftsperson to make into decorative ornaments. The farmer sells his wheat to the craftsperson for \$300. The craftsperson adds labor, valued at \$200, and some ribbons, valued at \$50, and produces 110 ornaments. What is the final market value of each ornament? _____
- Unplanned inventory _____ (is, is not) included in the GDP.
- Government spending on goods and services _____ (is, is not) the largest component of GDP as expenditures.
- Write the formulas for the following:
 Gross domestic product as expenditures (GDP) _____
 Gross domestic product as income (GDP) _____
 Gross national product (GNP) _____
 Net national product (NNP) _____
 National income (NI) _____
 Personal income (PI) _____
 Disposable personal income (DPI) _____

14. Use the information below to calculate GDP, GNP, NNP, and NI. All figures are in billions of dollars.

Capital consumption allowance	328	Wages and salaries	1,803
Corporate profits	124	Personal taxes	398
Rents	6	Indirect business taxes	273
Interest	264	Proprietor's income	248
Net factor income from abroad	43		
GDP _____	GNP _____	NNP _____	NI _____

Section 2: Nominal and Real Measures

1. The table below shows nominal GDP and the GDP price index for 3 years. Use this information to calculate the real GDP and to answer the following questions.

Year	Nominal GDP	GDP	
		Price Index	Real GDP
1	206	98	_____
2	216	100	_____
3	228	115	_____

- Which year is the base year? _____
 - Prices in year 3 were _____ (higher, lower) than prices in the base year.
 - During year 3, nominal GDP _____ (increased, did not change, decreased) and real GDP _____ (increased, did not change, decreased).
2. You have been asked to calculate chain-type real GDP growth from year 1 to year 2 for an economy that produces three products: cereal, beef, and doughnuts. You have been given the following data:

	Product	Quantity	Price
Year 1	Cereal	1,000	\$1.00
	Beef	700	\$2.00
	Doughnuts	600	\$0.50
Year 2	Cereal	1,400	\$1.10
	Beef	900	\$2.50
	Doughnuts	500	\$0.75

- What is the constant-dollar real GDP growth rate from year 1 to year 2, using year 1 as the base year? _____
- What is the constant-dollar real GDP growth rate from year 1 to year 2, using year 2 as the base year? _____
- What is the chain-type real GDP growth rate from year 1 to year 2? _____

3. An increase in the _____ index can indicate a coming change in the CPI.
4. Why isn't nominal GDP a good measure of the strength or weakness of the economy? What measure would be better?

5. If the price index in the current year is 212, then prices have _____ (increased, not changed, decreased) by _____ percent from the base year.

Section 3: Flows of Income and Expenditures

1. Fill in the diagram below with the terms listed below. Dollar flows are represented by light gray lines. The flow of physical goods and services is represented by dark gray lines.

investment

payments for goods and services

taxes

resource services

net exports

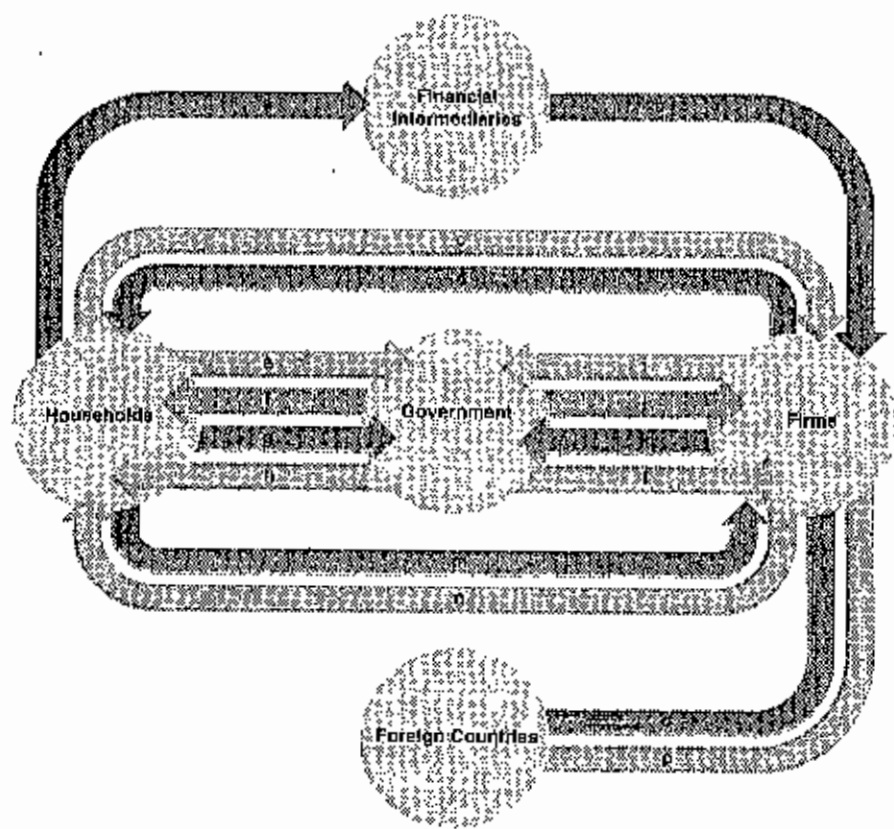
saving

goods and services

government services

payments for resource services

payments for net exports



Thinking About and Applying National Income Accounting

I. Difficulties in Measuring GDP

GDP is used to measure economic performance and to determine whether the overall standard of living is improving or declining. But does GDP really measure the total output of the economy? Decide if each item listed below is counted as part of GDP. If the item is *not* counted but is productive activity, indicate whether its omission overstates or understates GDP.

1. cocaine sold by Colombians to U.S. consumers
2. your parents' service to the family doing housework
3. a college textbook published this year
4. the fee for your cat's yearly rabies vaccine
5. intermediate goods
6. \$10 paid for a 3-year-old infant car seat purchased at a garage sale
7. your teacher's salary this year
8. this year's rental income from an office building
9. the services of a homeowner painting his or her own house
10. pollution produced as a result of steel production

II. The Expenditures Approach for Calculating GDP

1. Use the information below to calculate GDP, GNP, NNP, NI, PI, and DPI. All figures are in billions of dollars.

Net factor income from abroad	112
Income earned but not received	110
Personal taxes	198
Government purchases of goods and services	396
Capital consumption allowance	684
Personal consumption expenditures	1,326
Imports	800
Gross private domestic investment	296
Income received but not earned	225
Exports	670
Indirect business taxes	515
GDP _____ GNP _____ NNP _____	
NI _____ PI _____ DPI _____	

III. Understanding Price Indexes

Suppose the economy of Strandaville produces only four goods: trolls, pizza, desk chairs, and sweaters. The table below shows the dollar value of output for three different years.

Year	Number of Trolls	Price per Troll	Number of Pizzas	Price per Pizza
1	1,000	\$5	8,000	\$6.00
2	1,000	\$6	8,000	\$6.60
3	4,000	\$7	10,000	\$6.80

Year	Number of Desk Chairs	Price per Chair	Number of Sweaters	Price per Sweater
1	3,000	\$20	5,000	\$20
2	3,000	\$25	5,000	\$18
3	3,500	\$25	4,900	\$15

1. Calculate the total dollar value of output for year 1, year 2, and year 3.

2. The dollar value of output in year 2 is higher than the dollar value of output in year 1
- entirely because of price changes.
 - entirely because of output changes.
 - because of both price and output changes.
3. The dollar value of output in year 3 is higher than the dollar value of output in year 1
- entirely because of price changes.
 - entirely because of output changes.
 - because of both price and output changes.

IV. Reconciling GDP as Income and GDP as Expenditures

Martin Rabblcrouser is trying to calculate the GDP for an obscure Latin American country, but has gotten his accounts all mixed up. Use the information below (all figures are in billions of dollars) to calculate

- GDP as expenditures _____

- GDP as income _____

Income received but not earned	133
Net factor income from abroad	50
Personal consumption expenditures	2,466
Rent	-15
Capital consumption allowance	396
Imports	25
Indirect business taxes	331
Personal taxes	452
Income earned but not received	45
Government spending	691
Wages	2,200
Gross investment	457
Profits	454
Interest	284
Exports	11

Your answers to (1) and (2) should match.

- Now use your answer from (1) and (2) and the information above to calculate GNP, NNP, NI, PI, and DPI.
GNP _____ NNP _____ NI _____ PI _____
DPI _____



5. You have been hired by the government as an economic statistician and given the job of calculating the CPI (the *chili* price index, not the consumer price index). According to the government's official recipe, the ingredients for a batch of chili are:

3 pounds of hamburger

2 pounds of tomatoes

.5 pound of onions

The base year for calculating the CPI is 1996. The prices of the ingredients for chili are determined by an extensive nationwide survey. The current and 1996 prices for the ingredients are:

Hamburger: \$1.20 per pound in 1996; \$1.15 per pound currently

Tomatoes: \$1.50 per pound in 1996; \$1.75 per pound currently

Onions: \$.20 per pound in 1996; \$.30 per pound currently

Calculate the cost of a batch of chili in 1996 and currently, and express the current price as a price index with 1996 as the base year.

If your instructor assigns these problems, write your answers above, then tear out this page and hand it in.

Answers

Quick-Check Quiz

Section 1: Measures of Output and Income

1. c; 2. a; 3. a; 4. d; 5. a; 6. b; 7. a; 8. e; 9. b; 10. d; 11. a

If you missed any of these questions, you should go back and review Section 1 of Chapter 6.

Section 2: Nominal and Real Measures

1. d; 2. e; 3. c; 4. c; 5. a; 6. b; 7. d

If you missed any of these questions, you should go back and review Section 2 of Chapter 6.

Section 3: Flows of Income and Expenditures

1. e

If you missed this question, you should go back and review Section 3 of Chapter 6.

Practice Questions and Problems

Section 1: Measures of Output and Income

- market; final
- Intermediate goods
- Value added
- Inventory
- capital consumption allowance
- indirect business taxes
- real property rent
labor wages
capital interest

To get GDP, you must add profits, capital consumption allowance, and indirect business taxes and subtract net factor income from abroad.

- gross domestic product
- \$74.50 (The lei maker gets \$3.99 for each of her 50 leis, for a total of \$199.50. Since her cost for the flowers was \$125, her value added is \$199.50 - \$125 = \$74.50.)
- \$5 (The total of the values added is \$300 + \$200 + \$50 = \$550. The 110 ornaments are worth \$550, or \$5 each.)
- is
- is not—Consumption is the largest expenditure component.
- GDP (as expenditures) = $C + I + G + X$
GDP (as income) = wages + rent + interest + profits - net factor income from abroad + indirect business taxes + capital consumption allowance
GNP = GDP + net factor income from abroad
NNP = GNP - capital consumption allowance
NI = NNP - indirect business taxes
PI = NI + income received but not earned - income earned but not received
DPI = PI - personal taxes

14. $\text{GDP} = \text{wages} + \text{rent} + \text{interest} + \text{profits (corporate profits} + \text{proprietors' income)} - \text{net factor income from abroad} + \text{indirect business taxes} + \text{capital consumption allowance} = 1,803 + 6 + 264 + (124 + 248) - 43 + 328 + 273 = 3,003$
 $\text{GNP} = \text{GDP} + \text{net factor income from abroad} = 3,003 + 43 = 3,046$
 $\text{NNP} = \text{GNP} - \text{capital consumption allowance} = 3,046 - 328 = 2,718$
 $\text{NI} = \text{NNP} - \text{indirect business taxes} = 2,718 - 273 = 2,445$

Section 2: Nominal and Real Measures

1.

Year	Real GDP
1	$206/98 \times 100 = 210.20$
2	216 (this is the base year)
3	$228/115 \times 100 = 198.26$

- a. Year 2. You can tell because the price index is 100 for that year.
 b. higher
 c. increased; decreased
2. a. 5.6%

$$\frac{(\text{Expenditures in year 2 using year 1 prices})/(\text{Expenditures in year 1 using year 1 prices}) - 1 =}{(1,400 \text{ cereal} \times \$1.00) + (600 \text{ beef} \times \$2.00) + (500 \text{ doughnuts} \times \$0.50)} - 1 = \frac{(1,000 \text{ cereal} \times \$1.00) + (700 \text{ beef} \times \$2.00) + (600 \text{ doughnuts} \times \$0.50)}{\$2,850} - 1 = 1.056 - 1 = .056 \text{ or } 5.6\%$$
- b. 3.5%

$$\frac{(\text{Expenditures in year 2 using year 2 prices})/(\text{Expenditures in year 1 using year 2 prices}) - 1 =}{(1,400 \text{ cereal} \times \$1.10) + (600 \text{ beef} \times \$2.50) + (500 \text{ doughnuts} \times \$0.75)} - 1 = \frac{(1,000 \text{ cereal} \times \$1.10) + (700 \text{ beef} \times \$2.50) + (600 \text{ doughnuts} \times \$0.75)}{\$3,415} - 1 = 1.035 - 1 = .035 \text{ or } 3.5\%$$
- c. 4.5%
 Square root of (expenditures ratio with year 1 base \times expenditures ratio with year 2 base) - 1 = square root of $(1.056 \times 1.035) - 1 = \text{square root of } 1.093 - 1 = 1.045 - 1 = .045 \text{ or } 4.5\%$
3. producer price
4. Increases in nominal GDP can come about from a rise in prices, an increase in output, or both. To know if the economy is performing better than before, we need to know if output has increased. Real GDP is a better measure, since it rises only when output has increased.
5. increased; 112

Section 3: Flows of Income and Expenditures

- line a—saving
- line b—investment
- line c—payments for goods and services
- line d—goods and services
- line e—taxes
- line f—government services
- line g—resource services
- line h—payment for resource services
- line i—taxes
- line j—government services
- line k—goods and services
- line l—payments for goods and services
- line m—resource services
- line n—payments for resource services
- line o—net exports
- line p—payment for net exports

Thinking About and Applying National Income Accounting

I. Difficulties in Measuring GDP

1. The Colombians' sale of cocaine to U.S. consumers is an illegal activity and therefore not represented in the GDP. If the resources used to produce cocaine are domestically owned and production occurred this year, then this activity should be included in the GDP. Its omission would understate the GDP.
2. This activity does not involve a market transaction and therefore is not included in the GDP. It is productive activity, however, and its omission understates the GDP.
3. A college textbook published this year would be included in the GDP.
4. The fee for your cat's yearly rabies vaccine would be included in the GDP.
5. Intermediate goods are not counted in the GDP. To do so would be double-counting.
6. A 3-year-old car seat was not produced this year. It is not and should not be counted in the GDP.
7. Your teacher's salary this year is for productive activity and is included in the GDP.
8. This year's rental income from an office building represents productive activity—the use of the space over a period of time. It is included in the GDP.
9. The services of a homeowner painting his or her own house would not be included in the GDP, since no market transaction is involved. However, it does represent productive activity and should be included. GDP is understated by its omission.
10. Some economists feel that the production of "bads" such as pollution should be included in GDP if we are to get a true picture of economic well-being. Production of "bads" such as pollution is not currently included in GDP. Inclusion of "bads" would lower the GDP.

II. The Expenditures Approach for Calculating GDP

- $$\text{GDP} = C + I + G + X = 1,326 + 296 + 396 + (670 - 800) = 1,888$$

$$\text{GNP} = \text{GDP} + \text{net factor income from abroad} = 1,888 + 112 = 2,000$$

$$\text{NNP} = \text{GNP} - \text{capital consumption allowance} = 2,000 - 684 = 1,316$$

$$\text{NI} = \text{NNP} - \text{indirect business taxes} = 1,316 - 515 = 801$$

$$\text{PI} = \text{NI} - \text{income earned but not received} + \text{income received but not earned} = 801 - 110 + 225 = 916$$

$$\text{DPI} = \text{PI} - \text{personal taxes} = 916 - 198 = 718$$

III. Understanding Price Indexes

- The dollar value of output for year 1 is $1,000(5) + 8,000(6) + 3,000(20) + 5,000(20) = 213,000$. For year 2 the value is $1,000(6) + 8,000(6.6) + 3,000(25) + 5,000(18) = 223,800$. For year 3 the value is $4,000(7) + 10,000(6.8) + 3,500(25) + 4,900(15) = 257,000$.
- a
- c

IV. Reconciling GDP as Income and GDP as Expenditures

- $$\text{GDP (as expenditures)} = C + I + G + X$$

$$= 2,466 + 457 + 691 + (11 - 25) = 3,600$$
- $$\text{GDP (as income)} = \text{wages} + \text{rent} + \text{interest} + \text{profits} - \text{net factor income from abroad}$$

$$+ \text{indirect business taxes} + \text{capital consumption allowance}$$

$$= 2,200 + (-15) + 284 + 454 - 50 + 331 + 396 = 3,600$$
- $$\text{GNP} = \text{GDP} + \text{net factor income from abroad} = 3,600 + 50 = 3,650$$

$$\text{NNP} = \text{GNP} - \text{capital consumption allowance} = 3,650 - 396 = 3,254$$

$$\text{NI} = \text{NNP} - \text{indirect business taxes} = 3,254 - 331 = 2,923$$

$$\text{PI} = \text{NI} + \text{income received but not earned} - \text{income earned but not received}$$

$$= 2,923 + 133 - 45 = 3,011$$

$$\text{DPI} = \text{PI} - \text{personal taxes} = 3,011 - 452 = 2,559$$