chapter 7 (23)

Tracking the Macroeconomy

Chapter Objectives

Students will learn in this chapter:
- How economists use aggregate measures to track the performance of the economy.
- What gross domestic product, or GDP, is and the three ways of calculating it.
- The difference between real GDP and nominal GDP and why real GDP is the appropriate measure of real economic activity.
- What a price index is and how it is used to calculate the inflation rate.
- What some of the specific price indexes are and how economists use them.

Chapter Outline

Opening Example: Using an historical perspective of the tumultuous Portuguese economy in the mid-1970s, the example illustrates the importance of collecting and analyzing accurate data on the macroeconomy before instituting any economic or social policy measures.

I. The National Accounts

    A. In the United States, the Bureau of Economic Analysis—a division of the Commerce Department—collects and calculates various types of economic data and compiles them in the national product and income accounts.

    B. *Definition*: The **national income and product accounts,** or **national accounts,** keep track of the flow of money between different sectors of the economy.

    C. The expanded circular flow diagram, shown in Figure 7-1 (Figure 23-1) in the text, illustrates the flow of funds through the four sectors of the economy—households, firms, government, and the rest of the world—via three types of markets—factor markets, markets for goods and services, and financial markets.

    D. Households

        1. *Definition*: **Consumer spending** is household spending on goods and services.

        2. Most households receive the majority of their income from wages. However, some households also receive income from the ownership of stocks and bonds, which generate profit and interest income, respectively.

        3. *Definition*: A **stock** is a share in the ownership of a company held by a shareholder.

        4. *Definition*: A **bond** is borrowing in the form of an IOU that pays interest.

5. *Definition*: **Government transfers** are payments by the government to individuals for which no good or service is provided in return.

6. *Definition*: **Disposable income,** equal to income plus government transfers minus taxes, is the total amount of household income available to spend on consumption and savings.

7. *Definition*: **Private savings,** equal to disposable income minus consumer spending, is disposable income that is not spent on consumption.

8. The total sum of flows of money out of households—the sum of taxes paid, consumer spending, and private savings—must equal the total flow of money into households—the sum of wages, profits, interest, rent, and government transfers.

E. *Definition*: The banking, stock, and bond markets, which channel private savings and foreign lending into investment spending, government borrowing, and foreign borrowing, are known as the **financial markets.**

F. Government

1. *Definition*: **Government borrowing** is the amount of funds borrowed by the government in the financial markets.

2. *Definition*: **Government purchases of goods and services** are government expenditures on goods and services.

G. International Sector

1. *Definition*: **Exports** are goods and services sold to residents of other countries.

2. *Definition*: **Imports** are goods and services purchased by residents of other countries.

3. *Definition*: **Net exports** are the difference between the value of exports and the value of imports.

H. Business Investment

1. *Definition*: **Investment spending** is spending on productive physical capital, such as machinery and construction of structures, and on changes to inventories.

2. *Definition:* **Inventories** are the stocks of goods and services and raw materials that companies hold to enable their business operations.

I. Gross Domestic Product

1. *Definition*: **Final goods and services** are goods and services sold to the final, or end, user.

2. *Definition*: **Intermediate goods and services** are goods and services—bought from one firm by another firm—that are inputs for production of final goods and services.

3. *Definition*: **Gross domestic product,** or **GDP,** is the total value of all final goods and services produced in the economy during a given year.

4. GDP is used as a measure of the size of an economy and can also be used to compare the economic performance in other countries.

5. There are three ways to measure GDP:
   • As the value of production of final goods and services.
   • As spending on domestically produced final goods and services.
   • As factor income earned from firms in the economy.

6. *Definition*: **Aggregate spending,** the sum of consumer spending, investment spending, government purchases, and exports minus imports, is the total spending on domestically produced final goods and services in the economy.

J. Measuring GDP as the value of production of final goods and services

   1. GDP is calculated by summing the value of all final goods and services produced in an economy in a given year.

   2. The value of intermediate goods is omitted from this calculation of GDP. This is because if the value of intermediate goods is included, this would result in double-counting or more, since the value of intermediate goods is already included in the value of final goods. For example, the value of the steel produced that is used in an automobile is not counted in GDP since this is an intermediate good. However, the value of this steel adds to the value of the automobile, a final good, which is included in GDP.

   3. *Definition*: The **value added** of a producer is the value of its sales minus the value of its purchases of inputs.

   4. An alternative approach to computing GDP is to sum the value added by all firms.

   5. To avoid double-counting, only each producer's value added is counted in the calculation of GDP.

K. Measuring GDP as spending on domestically produced final goods and services

   1. GDP is calculated by summing spending on all final goods and services by all sectors of the economy—households (*C*), businesses (*I*), governments (*G*), and foreigners (*X*)—are added together and spending on imports (*IM*) is subtracted.

   2. Mathematically stated:

   $$GDP = C + I + G + X - IM$$

L. Measuring GDP as factor income earned from firms in the economy

   1. GDP is calculated by adding all of the income earned by factors of production from firms in the economy. This includes:
   - Wages earned by labor
   - Interest earned by those who lend their savings to firms and the government
   - Rent earned by those who lease their land or structures to firms
   - Profit earned by the owners of capital

M. The components of GDP spending in 2007 included:

   1. Consumer spending: $9,710 billion, or 70.3% of GDP

   2. Government spending: $2,675 billion, or 19.4% of GDP

   3. Investment spending: $2,130 billion, or 15.4% of GDP

   4. Net Exports: –$708 billion, or –5.1% of GDP
   The components of GDP are illustrated in Figure 7-3 (Figure 23-3) in the text.

II. Real GDP and Aggregate Output

A. *Definition:* **Aggregate output** is the total quantity of goods and services the economy produces.

B. *Definition*: **Real GDP** is the total value of all final goods and services produced in the economy during a given year, calculated using the prices of a selected base year.

C. *Definition*: **Nominal GDP** is the value of all final goods and services produced in the economy during a given year, calculated using the prices current in the year in which the output is produced.

D. To determine the actual growth in aggregate output, we calculate the change in real GDP using prices from some given base year, as in the following:

$$\text{Growth in real GDP} = \frac{\text{Real GDP in year 2} - \text{Real GDP in year 1}}{\text{Real GDP in year 1}}$$

   1. *Definition:* **Chained dollars** split the difference in growth rates calculated using early base years and the growth rates calculated using late base years.

E. *Definition*: **GDP per capita** is GDP divided by the size of the population; it is equivalent to the average GDP per person.

$$\text{GDP per capita} = \frac{\text{GDP}}{\text{size of the population}}$$

F. Real per capita GDP is not a sufficient measure of human welfare or the quality of life, which also depends on how the GDP is spent.

III. Price Indexes and the Aggregate Price Level

A. *Definition:* The **aggregate price level** is a single number representing the overall level of prices.

B. *Definition*: A **market basket** is a hypothetical set of consumer purchases of goods and services.

C. *Definition*: A **price index** measures the cost of purchasing a given market basket in a given year, where that cost is normalized so that it is equal to 100 in the selected base year.

D. Formula for price index:

$$\text{Price index in a given year} = \frac{\text{(Cost of market basket in a given year)}}{\text{(Cost of market basket in base year)}} \times 100$$

E. *Definition*: The **inflation rate** is the percent change per year in a price index—typically, the consumer price index.

F. The inflation rate from year 1 to year 2 is computed as:

$$\text{Inflation rate} = \frac{\text{(Price index in year 2)} - \text{(Price index in year 1)}}{\text{(Price index in year 1)}} \times 100$$

G. There are three measures of prices in the macroeconomy including:
- The Consumer Price Index, or CPI
- The Producer Price Index, or PPI
- The GDP Deflator

H. *Definition*: The **consumer price index,** or **CPI,** measures the cost of the market basket of a typical urban American family.

I. *Definition*: The **producer price index,** or **PPI,** measures changes in the prices of goods purchased by producers.

J. *Definition*: The **GDP deflator** for a given year is 100 times the ratio of nominal GDP to real GDP in that year.

Teaching Tips

The National Accounts

Creating Student Interest

Ask students if they have ever heard of "GDP"—they probably have. Ask them what the letters *G*, *D*, and *P* stand for. Again, they will probably know. Then ask them what GDP measures. Here you may find they are less certain. Explain each of the terms:

> Gross—the total amount
>
> Domestic—for the home country (e.g., United States)
>
> Product—amount produced.

So, GDP is a measure of the total amount of output produced by the United States (or whatever country is being considered).

Have the students consider why we would want to keep track of the total amount produced in the economy. What does it mean if we produce more, or less? Link GDP to the business cycle and employment levels.

Ask students what they think is the value of U.S. GDP (present the most current value—which you can find on the web page listed under Web Resources).

Presenting the Material

Figure 7-1 (Figure 23-1) of the text, The Expanded Circular-Flow Diagram: The Flows of Money through the Economy, demonstrates the manner in which money flows from producers to households, governments, and the rest of the world, and vice versa. Since this figure is quite complex at first glance to students, break up the elements in the diagram and describe them individually. First, identify the major economic agents—households, firms, governments, and the rest of the world—and the markets—product markets, factor markets, and financial markets. Afterward, concentrate on the flows of money, using the arrows in the diagram below.

**An Expanded Circular-Flow Diagram:
The Flows of Money Through the Economy**
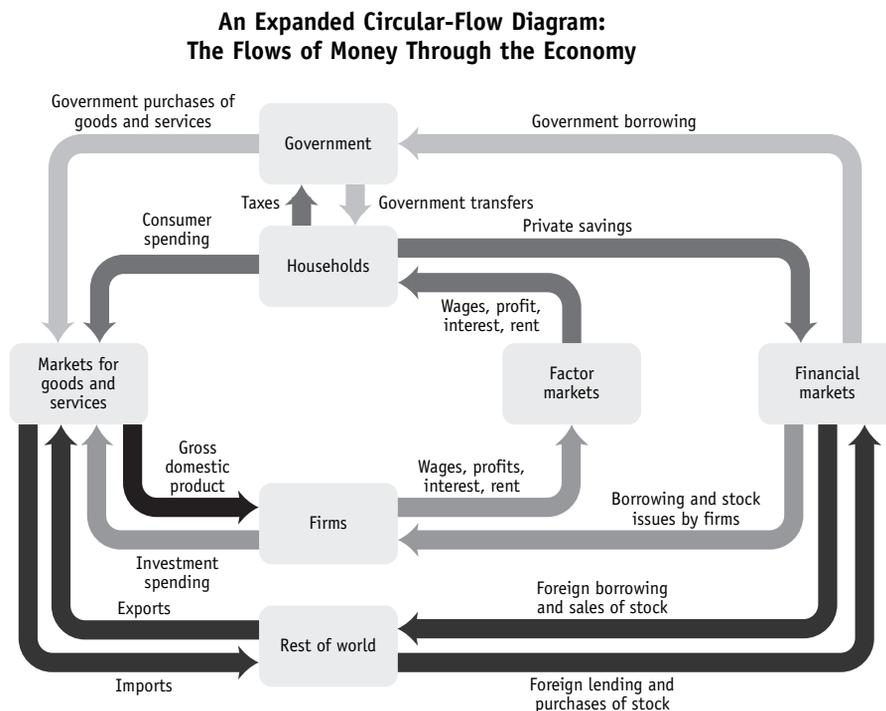
Present the definition of GDP in writing (write it on the board): the total value of all final goods and services produced in an economy during a given period. After showing the entire definition, highlight each component and explain its importance.

Value—we can't add apples and oranges (literally!) to find a meaningful number. Think of adding one car to one pair of socks and getting "2"—it doesn't make sense. So, we add up the market value of the output (we *can* add dollars and dollars). This sets up the later discussion of the exclusion of non-market production from the calculation of GDP as well as the difference between "real" and "nominal."

Final—explain that, to avoid double counting, we add up only final production (or we could use the value-added approach).

Goods and services—these are both included in GDP. The difference is that goods are tangible and can be stored in inventories (unlike a service, e.g. a haircut—you can't buy two haircuts and save one for later!). However, both represent output and are included in GDP.

An economy—GDP can be calculated for any group of countries, individual country, state (gross state product), region, or whatever definition of an economy is of interest.

A given period—since we are continuously producing, we have to identify the period over which we are measuring output. Output is a "flow" variable (like a river) rather than a stock variable (like a lake). We don't all stop and count output on December 31, so we have to identify a time period and count only what was produced during that time period. GDP can be calculated annually, quarterly, monthly, etc.

Real GDP: A Measure of Aggregate Output

Creating Student Interest

Present the following data (from the Bureau of Economic Analysis) to the class. In 2000, the value of output produced by the soft drink industry was $3,301,800,000. In 2006, that number was $4,057,500,000. Therefore, between 2000 and 2006, the United States' GDP increased by 755,700,000 as a result of soft drink production.

Ask the students what caused the increase in the value of soft drink output between 2000 and 2006. Students will likely realize that there were more soft drinks produced in 2006, but help them to also understand that the price of soft drink went up over that time (by approximately 13%). Therefore, the increase in (nominal) GDP reflects both the price and production increases.

Presenting the Material

Using the data presented in Table 7-1 (Table 23-1) of the text, first show students how to compute nominal GDP for year 1. Next, ask students to compute nominal GDP for year 2 independently. Follow a similar process when computing real GDP for years 1 and 2, assuming year 1 is the base year. Point out the differences in value in nominal and real GDP for year 2.

Calculating GDP and Real GDP in a Simple Economy

	Year 1	Year 2
Quantity of apples (billions)	2,000	2,200
Price of apple	$0.25	$0.30
Quantity of oranges (billions)	1,000	1,200
Price of orange	$0.50	$0.70
GDP (billions of dollars)	$1,000	$1,500
Real GDP (billions of year 1 dollars)	$1,000	$1,150

Price Indexes and the Aggregate Price Level

Creating Student Interest

Present the following data to the class. In September 2008, a tank of gas for a car cost $58.40 (average price in the United States for regular gas, average size gas tank). In September 2007, the cost was $43.84. The average size gas tank didn't change over that time—so why does it cost more to fill the tank? Of course students will see that it is the increase in the price of a gallon of gas over that time. Use the web resources to calculate the average cost to fill a car's gas tank today.

Ask students how much inflation they think the U.S. economy is currently experiencing. Present the most recent numbers (see Web Resources).

Presenting the Material

Explain the notion of a market basket and how it is used in the computation of price indexes. Afterward, use the data in Table 7-3 (Table 23-3) of the text to compute the pre-frost cost of a market basket of citrus fruit on the board. Ask students to compute the cost of the post-frost market basket independently. After ensuring that students have completed their calculations correctly, compute the following as a class:

- The price index
- The rate of inflation

Calculating the Cost of a Market Basket

	Pre-frost	Post-frost
Price of orange	$0.20	$0.40
Price of grapefruit	$0.60	$1.00
Price of lemon	$0.25	$0.45
Cost of market basket (200 oranges, 50 grapefruit, 100 lemons)	(200 x $0.20) + (50 x $0.60) + (100 x $0.25) = $95.00	(200 x $0.40) + (50 x $1.00) + (100 x $0.45) = $175.00

It is also important that students understand the differences in the three measures of prices—the consumer price index, the producer price index, and the GDP deflator—as well as the appropriate uses of each.

Common Student Pitfalls

- **Three Ways to calculate GDP.** Because GDP can be calculated three different ways—summing income earned, summing expenditures, and summing the value of production—students may mistakenly believe that these three methods yield different values for GDP in a given period. Emphasize to students that this is not the case, because ultimately the value of all final goods and services produced must equal the value of income earned in the production of all final goods and services in a given year.
- **Real versus nominal GDP.** Since students often think of output in physical terms rather than in monetized terms, they may not immediately see the need for measuring real GDP. Emphasize that all goods and services are measured in monetized terms, so the value of production of all goods and services can be summed together when calculating GDP. Ask students if the number of goods and services produced per year changes and if the prices of goods and services change each year. Suppose, for example that GDP is increasing from one year to another, we cannot determine if the reason GDP is rising is due to higher prices or a greater amount of output being produced. This is why we must look at real measures of monetized economic variables, such as GDP, when we compare their values over time.
- **The price level versus ALL prices.** Students may mistakenly believe that a reported increase in the CPI means that all prices of goods and services in the economy are increasing at the same stated rate. Emphasize that the CPI, or any price index, indicates the rate of change for the average of all prices included in the index.

Case Studies in the Text

Economics in Action

Creating the National Accounts—This EIA explains when, why, and by whom national income accounting was developed.

Ask students the following questions:

1. When, why, and by whom were national income accounts first created? (Answer: during the Great Depression, the need for information to help understand/address the depression, Simon Kuznets)
2. When and why were the national income accounts expanded to focus on production? (Answer: 1942, World War II)

Miracle in Venezuela?—This EIA presents the growth rates of nominal GDP and real GDP for Venezuela between 1997 and 2007.

Ask students the following questions:

1. By how much did Venezuelan nominal GDP grow between 1997 and 2007? Why? (Answer: an average of 28% per year. Inflation)
2. By how much did Venezuelan real GDP grow over the same period? (Answer: an average annual rate of 2.9%)

Indexing to the CPI—This EIA explains the practice of indexing payments to the CPI.

Ask students the following questions:

1. What does it mean to index a payment to the CPI and why is it done? (Answer: tying the payment to the CPI so that it goes up and down with

inflation and contraction, keeping the real value of the payment steady)

2. What are examples of important payments indexed to the CPI? (Answer: Social Security, tax payments—through tax brackets)

For Inquiring Minds

Our Imputed Lives—This FIM explains how economists try to "impute" the value of household work and how they include an imputation for the value of owning your own home (rather then renting) in GDP calculation.

Gross What?—This FIM explains the difference between GDP and GNP.

Is the CPI Biased?—This FIM presents several reasons some economists believe the CPI systematically overstates the actual rate of inflation.

Global Comparison

GDP and the Meaning of Life—This Global Comparison presents data for real GDP per capita and a measure of satisfaction for a variety of countries.

Activities

What's In and What's Out? (15 minutes)

Pair students and ask them to categorize the following items as either included in the calculation of GDP or excluded from it. Also ask students to indicate the reason for their choice in each case.

- Hamburger buns bought by McDonald's Corporation for making Big Macs (Answer: Excluded from GDP since they constitute an intermediate good.)
- A used macroeconomics textbook (Answer: Excluded from GDP since it is not a newly produced good.)
- A new pair of Levi's jeans (Answer: Included in GDP since it is a newly produced good.)
- Newly purchased shares of Google stock (Answer: Excluded from GDP since they are not a good or service that is produced.)
- A new Chrysler P.T. Cruiser automobile (Answer: Included in GDP since it is a newly produced good.)
- A new Lexus SUV (Answer: Excluded from GDP since it is not a domestically produced good.)
- A newly purchased $10,000 U.S. Treasury Bill (Answer: Excluded from GDP since it is not a good or service that is produced.)
- A cup of coffee purchased at Starbucks (Answer: Included in GDP as it is a newly produced good.)

Who's Spending? (10 minutes)

Ask students to rank, from highest to lowest, the following types of spending included in GDP:

- Government spending
- Consumer spending
- Business spending
- Net exports

Answer:
- Largest: Consumer spending makes up 70.1% of GDP
- Government spending is 18.6% of GDP
- Investment spending is 16.4% of GDP
- Smallest: Net exports amount to –5.2% of GDP

Calculating Nominal and Real GDP (20 minutes)

Ask students to use the data in the following table, where it is assumed that only two goods, bread and cake, are produced in an economy, and 2004 is the base year.

	2004	2005
Quantity of bread (billions)	5,000	6,000
Price of bread	$2.50	$2.25
Quantity of cake (billions)	1,200	1,150
Price of cake	$4.00	$3.80

Calculate the following:

1. Nominal GDP in 2004 and 2005
2. Real GDP in 2004 and 2005

Answers:

1. Nominal GDP in 2004 = (5,000 × $2.50) + (1,200 × $4.00)
   = $17,300 billion
   Nominal GDP in 2005 = (6,000 × $2.25) + (1,150 × $3.80)
   = $17,870 billion
2. Real GDP in 2004 = (5,000 × $2.50) + (1,200 × $4.00)
   = $17,300 billion
   Real GDP in 2005 = (6,000 × $2.50) + (1,150 × $4.00)
   = $19,600 billion

Per Capita GDP in LDCs (10 minutes)

Explain to students that a persistent problem plaguing less-developed countries is low per-capita GDP. Ask students for ways this problem can be alleviated.

Answers may include:
- Increasing labor productivity, which will lead to greater output and hence higher levels of GDP
- Controlling population growth rates
- Improving the capital stock, which will lead to greater output and hence higher levels of GDP
- Improving the state of technology

Which One? (20 minutes)

Pair students and ask them to determine the most appropriate price index to use in each of the following situations and to provide justification for each answer.

1. Chris is writing a research paper on the automobile industry. She needs to include a discussion of how higher costs of production have affected American auto producers. What price index should she use? (Answer: Chris should use the Producer Price Index to measure changes in prices paid by producers of goods.)
2. Charles works as an economist for the United Mine Workers. He is developing the justification for the pay raise the union is seeking from man-

agement in its new contract. What price index should he use? (Answer: Charles should use the Consumer Price Index to demonstrate that the union members' wages should rise by at least the same rate as the increase in consumer prices.)

3. William is a television reporter. He is preparing a documentary on the status of the U.S. economy. His documentary will focus on all sectors of the economy. What price index should he use? (Answer: William should use the GDP deflator, since it measures inflation as it affects all sectors of the economy.)

4. In November, Lucy volunteered to compute the value of her grandmother's Social Security payments for the following year. What price index should she use? (Answer: Lucy should use the CPI, since this is the measure used to index Social Security payments for inflation each year.)

Web Resources

The following website provides information on GDP and inflation:

Smart Money Economy Watch—GDP: http://www.smartmoney.com/economywatch/

Bureau of Labor Statistics— Inflation (CPI): http://www.bls.gov/CPI/

Energy Information Administration—average gas prices:
http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_home_page.html