• 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
An Expanded Circular-Flow Diagram

- **Government**
  - Government purchases of goods and services
  - Government borrowing

- **Households**
  - Consumer spending
  - Taxes
  - Government transfers
  - Wages, profit, interest, rent

- **Firms**
  - GDP
  - Investment
  - Wages, profit, interest, rent

- **Factor Markets**
  - Borrowing and stock issues by firms
  - Foreign borrowing and sales of stock

- **Markets for goods and services**
  - Consumer spending
  - Exports
  - Imports

- **Financial Markets**
  - Private savings
  - Foreign lending and purchases of stock

- **Rest of the world**
  - Exports
  - Imports

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**Key Terms**
- Consumer spending
- Government purchases of goods and services
- Private savings
- External accounts
- Factor markets
- Financial markets
- GDP
- Investment
- Exports
- Imports
The National Accounts

- Almost all countries calculate a set of numbers known as the **national income and product accounts**.

- The national income and product accounts, or national accounts, keep track of the flows of money between different parts of the economy.
Gross Domestic Product

- **Gross domestic product** or GDP measures the total value of all *final goods and services* produced in the economy during a given year. It does not include the value of *intermediate goods*.

- **Aggregate spending** — the sum of consumer spending, investment spending, government purchases of goods and services, and exports minus imports — is the total spending on domestically produced final goods and services in the economy.
Calculating Gross Domestic Product

- GDP can be calculated three ways:
  1) Add up the **value added** of all producers
  2) Add up all spending on domestically produced final goods and services.
     - This results in the equation: \( GDP = C + I + G + X - IM \)
  3) Add up all income paid to factors of production
Calculating Gross Domestic Product

<table>
<thead>
<tr>
<th></th>
<th>American Ore, Inc.</th>
<th>American Steel, Inc.</th>
<th>American Motors, Inc.</th>
<th>Total factor income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value of sales</strong></td>
<td>$4,200 (ore)</td>
<td>$9,000 (steel)</td>
<td>$21,500 (car)</td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate goods</strong></td>
<td>0</td>
<td>4,200 (iron ore)</td>
<td>9,000 (steel)</td>
<td></td>
</tr>
<tr>
<td><strong>Wages</strong></td>
<td>2,000</td>
<td>3,700</td>
<td>10,000</td>
<td>$15,700</td>
</tr>
<tr>
<td><strong>Interest payments</strong></td>
<td>1,000</td>
<td>600</td>
<td>1,000</td>
<td>2,600</td>
</tr>
<tr>
<td><strong>Rent</strong></td>
<td>200</td>
<td>300</td>
<td>500</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Profit</strong></td>
<td>1,000</td>
<td>200</td>
<td>1,000</td>
<td>2,200</td>
</tr>
<tr>
<td><strong>Total expenditure by firm</strong></td>
<td>4,200</td>
<td>9,000</td>
<td>21,500</td>
<td></td>
</tr>
</tbody>
</table>

Value added per firm = Value of sales – cost of intermediate goods

Sum of value added = $21,500

Total spending on domestically produced final goods and services = $21,500
GDP: What’s In and What’s Out

Included

- domestically produced final goods and services (including capital goods)
- new construction of structures
- changes to inventories

Not Included

- intermediate goods and services
- inputs
- used goods
- financial assets like stocks and bonds
- foreign-produced goods and services
Components of GDP (billions of dollars)

- Value added by government = 12.5%
- Value added by households = 12.7%
- Value added by business = 74.9%

Government purchases of goods and services = 20.7%
Investment spending = 12.4%
Consumer spending = 70.5%

Total Spending on domestically produced final goods and services = $14,527

Net exports X - IM = -$517 (-3.6%)
Occasionally you may see references not to gross domestic product but to *gross national product*, or GNP.

- GNP is defined as the total factor income earned by residents of a country.
  - It excludes factor income earned by foreigners, like profits paid to foreign investors who own American stocks and payments to foreigners who work temporarily in the United States.
  - And it includes factor income earned abroad by Americans, like the profits of IBM’s European operations that accrue to IBM’s American shareholders and the wages of Americans who work abroad temporarily.
GROSS WHAT?

- GDP’s considered a better indicator of short-run movements in production and because data on international flows of factor income are considered somewhat unreliable.

- It doesn’t make much difference which measure is used for large economies like the United States, where the flows of net factor income to other countries are relatively small.
  - In 2010, America’s GNP was about 1.3% larger than its GDP, mainly because of the overseas profit of U.S. companies.
GROSS WHAT?

- For smaller countries, however, GDP and GNP can diverge significantly.
  - Example: Much of Ireland’s industry is owned by U.S. corporations; those profits must be deducted from Ireland’s GNP.
  - In addition, Ireland has become a host to many temporary workers from poorer regions of Europe, whose wages must also be deducted from Ireland’s GNP.
  - As a result, in 2010 Ireland’s GNP was only 82% of its GDP.
Creating the National Accounts

- The national accounts owe their creation to the Great Depression.

- Simon Kuznets developed a set of national income accounts. The first version of these accounts was presented to Congress in 1937 and in a research report titled *National Income*. 
Real versus Nominal GDP

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

• **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.
Real versus Nominal GDP

• Except in the base year, real GDP is not the same as nominal GDP, output valued at current prices.

• Chained dollars is the method of calculating changes in real GDP using the average between the growth rate calculated using an early base year and the growth rate calculated using a late base year.

• GDP per capita is a measure of average GDP per person, but is not by itself an appropriate policy goal.
### Nominal versus Real GDP in 1995, 2005, and 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal GDP (billions of current dollars)</th>
<th>Real GDP (billions of 2005 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>$7,415</td>
<td>$9,086</td>
</tr>
<tr>
<td>2005</td>
<td>12,623</td>
<td>12,623</td>
</tr>
<tr>
<td>2010</td>
<td>14,527</td>
<td>13,088</td>
</tr>
</tbody>
</table>
• Rich is better
• Money matters less as you grow richer
• Money isn’t everything
Miracle in Venezuela?

• The South American nation of Venezuela has a distinction that may surprise you: in recent years, it has had one of the world’s fastest-growing nominal GDPs. Between 1997 and 2007, Venezuelan nominal GDP grew by an average of 28% each year—much faster than nominal GDP in the United States or even in booming economies like China.

• So, is Venezuela experiencing an economic miracle?
Miracle in Venezuela?

- No, it’s just suffering from unusually high inflation.
Price Indexes and the Aggregate Price Level

• The **aggregate price level** is a measure of the overall level of prices in the economy.

• To measure the aggregate price level, economists calculate the cost of purchasing a **market basket**.

• A **price index** is the ratio of the current cost of that market basket to the cost in a base year, multiplied by 100.

\[
\text{Price index in a given year} = \left( \frac{\text{Cost of market basket in a given year}}{\text{Cost of market basket in base year}} \right) \times 100
\]
Inflation Rate, CPI, and other Indexes

• The **inflation rate** is the yearly percentage change in a price index, typically based on the **Consumer Price Index**, or **CPI**, the most common measure of the aggregate price level.

• The consumer price index measures the cost of the market basket of a typical urban American family.

\[
\text{Inflation rate} = \frac{(\text{Price index in year 2} - \text{Price index in year 1})}{(\text{Price index in year 1})} \times 100
\]
Consumer Price Index

- Housing: 41%
- Food & beverages: 15%
- Transportation: 12%
- Motor fuel: 5%
- Apparel: 4%
- Medical care: 5%
- Recreation: 6%
- Education & communication: 6%
- Other goods and services: 3%
- Medical care: 5%
Is the CPI biased?

- The U.S. government takes considerable care in measuring consumer prices.
  - Nonetheless, many economists believe that the consumer price index systematically *overstates* the actual rate of inflation.
Is the CPI biased?

• One reason is the fact that the CPI measures the cost of buying a given market basket.
  - Yet, consumers typically alter the mix of goods and services they buy, reducing purchases of products that have become relatively more expensive and increasing purchases of products that have become relatively cheaper.

• The second reason arises from innovation.
  - By widening the range of consumer choice, innovation makes a given amount of money worth more.
Other Price Measures

- A similar index to CPI for goods purchased by firms is the **producer price index**.

- Economists also use the **GDP deflator**, which measures the price level by calculating the ratio of nominal GDP to real GDP.

- The GDP deflator for a given year is 100 times the ratio of nominal GDP to real GDP in that year.
Measures of Inflation: Trend

Percent change in the CPI, PPI, GDP deflator

Year


25%

20%

15%

10%

5%

0%

-5%

-10%

-15%

-20%

PPI

CPI

GDP deflator
Indexing to the CPI

• The CPI has a direct and immediate impact on millions of Americans.
  - The reason is that many payments are tied, or “indexed,” to the CPI—the amount paid rises or falls when the CPI rises or falls.

• Today, 48 million people receive checks from Social Security. The amount of an individual’s check is determined by a formula that reflects his or her previous payments into the system, as well as other factors.
Indexing to the CPI

- In addition, all Social Security payments are adjusted each year to offset any increase in consumer prices over the previous year.
  - The CPI is used to calculate the official estimate of the inflation rate used to adjust these payments yearly.
1. Economists keep track of the flows of money between sectors with the **national income and product accounts**, or national accounts.

Households earn income via the factor markets from wages. **Disposable income** is allocated to **consumer spending** \((C)\) and **private savings**. Via the **financial markets**, private savings and foreign lending are channeled to **investment spending** \((I)\), government borrowing, and foreign borrowing. **Government purchases of goods and services** \((G)\) are paid for by tax revenues and any **government borrowing**. **Exports** \((X)\) generate an inflow of funds into the country from the rest of the world, but **imports** \((IM)\) lead to an outflow of funds to the rest of the world.
2. **Gross domestic product**, or **GDP**, measures the value of all final goods and services produced in the economy.

It does not include the value of **intermediate goods and services**, but it does include **inventories** and **net exports** \((X - IM)\).

It can be calculated in three ways: add up the **value added** by all producers; add up all spending on domestically produced final goods and services \((GDP = C + I + G + X - IM)\); or add up all the income paid by domestic firms to factors of production. These three methods are equivalent.
3. Real GDP is the value of the final goods and services produced calculated using the prices of a selected base year. Except in the base year, real GDP is not the same as nominal GDP, the value of aggregate output calculated using current prices.

Analysis of the growth rate of aggregate output must use real GDP. Real GDP per capita is a measure of average aggregate output per person but is not in itself an appropriate policy goal. U.S. statistics on real GDP are always expressed in chained dollars.
4. To measure the **aggregate price level**, economists calculate the cost of purchasing a **market basket**. A **price index** is the ratio of the current cost of that market basket to the cost in a selected base year, multiplied by 100.

5. The **inflation rate** is the yearly percent change in a price index, typically based on the **consumer price index**, or **CPI**, the most common measure of the aggregate price level. A similar index for goods and services purchased by firms is the **producer price index**, or **PPI**. Finally, economists also use the **GDP deflator**, which measures the price level by calculating the ratio of nominal to real GDP times 100.
<table>
<thead>
<tr>
<th>Key Terms</th>
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</thead>
<tbody>
<tr>
<td>National income and product accounts (national accounts)</td>
</tr>
<tr>
<td>Consumer spending</td>
</tr>
<tr>
<td>Stock</td>
</tr>
<tr>
<td>Bond</td>
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<tr>
<td>Government transfers</td>
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<tr>
<td>Disposable income</td>
</tr>
<tr>
<td>Private savings</td>
</tr>
<tr>
<td>Financial markets</td>
</tr>
<tr>
<td>Government borrowing</td>
</tr>
<tr>
<td>Government purchases of goods and services</td>
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<tr>
<td>Exports</td>
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<tr>
<td>Imports</td>
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<tr>
<td>Inventories</td>
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<tr>
<td>Investment spending</td>
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<tr>
<td>Final goods and services</td>
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<tr>
<td>Intermediate goods and services</td>
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<tr>
<td>Gross domestic product (GDP)</td>
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<td>Value added</td>
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