

# Measuring National Output and National Income

## 20



### CHAPTER OUTLINE

#### Gross Domestic Product

- Final Goods and Services
- Exclusion of Used Goods and Paper Transactions
- Exclusion of Output Produced Abroad by Domestically Owned Factors of Production

#### Calculating GDP

- The Expenditure Approach
- The Income Approach

#### Nominal versus Real GDP

- Calculating Real GDP
- Calculating the GDP Deflator
- The Problems of Fixed Weights

#### Limitations of the GDP Concept

- GDP and Social Welfare
- The Underground Economy
- Gross National Income per Capita

#### Looking Ahead

**national income and product accounts** Data collected and published by the government describing the various components of national income and output in the economy.

# Gross Domestic Product

**gross domestic product (GDP)** The total market value of all final goods and services produced within a given period by factors of production located within a country.

GDP is the total market value of a country's output. It is the market value of all final goods and services produced within a given period of time by factors of production located within a country.

# Gross Domestic Product

## Final Goods and Services

**final goods and services** Goods and services produced for final use.

**intermediate goods** Goods that are produced by one firm for use in further processing by another firm.

**value added** The difference between the value of goods as they leave a stage of production and the cost of the goods as they entered that stage.

# Gross Domestic Product

## Final Goods and Services

In calculating GDP, we can sum up the value added at each stage of production or we can take the value of final sales. We do not use the value of total sales in an economy to measure how much output has been produced.

**TABLE 21.1 Value Added in the Production of a Gallon of Gasoline (Hypothetical Numbers)**

Stage of Production	Value of Sales	Value Added
(1) Oil drilling	\$3.00	\$3.00
(2) Refining	3.30	0.30
(3) Shipping	3.60	0.30
(4) Retail sale	4.00	0.40
Total value added		<u>\$4.00</u>

# Gross Domestic Product

## Exclusion of Used Goods and Paper Transactions

GDP is concerned only with new, or current, production. Old output is not counted in current GDP because it was already counted when it was produced.

GDP does not count transactions in which money or goods changes hands but in which no new goods and services are produced.

# Gross Domestic Product

## Exclusion of Output Produced Abroad by Domestically Owned Factors of Production

GDP is the value of output produced by factors of production *located within a country*.

**gross national product (GNP)** The total market value of all final goods and services produced within a given period by factors of production owned by a country's citizens, regardless of where the output is produced.

# Calculating GDP

**expenditure approach** A method of computing GDP that measures the total amount spent on all final goods and services during a given period.

**income approach** A method of computing GDP that measures the income—wages, rents, interest, and profits—received by all factors of production in producing final goods and services.



# Calculating GDP

## The Expenditure Approach

There are four main categories of expenditure:

- Personal consumption expenditures ( $C$ ): household spending on consumer goods
- Gross private domestic investment ( $I$ ): spending by firms and households on new capital, that is, plant, equipment, inventory, and new residential structures
- Government consumption and gross investment ( $G$ )
- Net exports ( $EX - IM$ ): net spending by the rest of the world, or exports ( $EX$ ) minus imports ( $IM$ )

$$GDP = C + I + G + (EX - IM)$$

# Calculating GDP

## The Expenditure Approach

**TABLE 21.2 Components of U.S. GDP, 2009: The Expenditure Approach**

	Billions of Dollars	Percentage of GDP
<b>Personal consumption expenditures (C)</b>	10,089.1	70.8
Durable goods	1,035.0	7.3
Nondurable goods	2,220.2	15.6
Services	6,833.9	47.9
<b>Gross private domestic investment (I)</b>	1,628.8	11.4
Nonresidential	1,388.8	9.7
Residential	361.0	2.5
Change in business inventories	−120.9	−0.8
<b>Government consumption and gross investment (G)</b>	2,930.7	20.5
Federal	1,144.8	8.0
State and local	1,786.9	12.5
<b>Net exports (<math>EX - IM</math>)</b>	−392.4	− 2.8
Exports ( $EX$ )	1,564.2	11.0
Imports ( $IM$ )	1,956.6	13.7
<b>Gross domestic product</b>	<u>14,256.3</u>	<u>100.0</u>

Note: Numbers may not add exactly because of rounding.

# Calculating GDP

## The Expenditure Approach

### Personal Consumption Expenditures (C)

**personal consumption expenditures (C)** Expenditures by consumers on goods and services.

**durable goods** Goods that last a relatively long time, such as cars and household appliances.

**nondurable goods** Goods that are used up fairly quickly, such as food and clothing.

**services** The things we buy that do not involve the production of physical things, such as legal and medical services and education.

# ECONOMICS IN PRACTICE

## Where Does eBay Get Counted?

eBay's business is to provide a marketplace for exchange. In doing so, it uses labor and capital and creates value.

In return for creating this value, eBay charges fees to the sellers that use its site. The value of these fees enter into GDP.

So while the old knickknacks that people sell on eBay do not contribute to current GDP, the cost of finding an interested buyer for those old goods does indeed get counted.



# Calculating GDP

## The Expenditure Approach

### Gross Private Domestic Investment (I)

**gross private domestic investment (I)** Total investment in capital—that is, the purchase of new housing, plants, equipment, and inventory by the private (or nongovernment) sector.

**nonresidential investment** Expenditures by firms for machines, tools, plants, and so on.

**residential investment** Expenditures by households and firms on new houses and apartment buildings.

# Calculating GDP

## The Expenditure Approach

### Gross Private Domestic Investment (I)

**change in business inventories** The amount by which firms' inventories change during a period. Inventories are the goods that firms produce now but intend to sell later.

*Change in Business Inventories*

$$\text{GDP} = \text{Final sales} + \text{Change in business inventories}$$

# Calculating GDP

## The Expenditure Approach

### Gross Private Domestic Investment (*I*)

#### *Gross Investment versus Net Investment*

**depreciation** The amount by which an asset's value falls in a given period.

**gross investment** The total value of all newly produced capital goods (plant, equipment, housing, and inventory) produced in a given period.

**net investment** Gross investment minus depreciation.

$$\text{capital}_{\text{end of period}} = \text{capital}_{\text{beginning of period}} + \text{net investment}$$

# Calculating GDP

## The Expenditure Approach

### Government Consumption and Gross Investment

#### **government consumption and gross investment ( $G$ )**

Expenditures by federal, state, and local governments for final goods and services.

### Net Exports ( $EX - IM$ )

**net exports ( $EX - IM$ )** The difference between exports (sales to foreigners of U.S.-produced goods and services) and imports (U.S. purchases of goods and services from abroad). The figure can be positive or negative.



# Calculating GDP

## The Income Approach

**national income** The total income earned by the factors of production owned by a country's citizens.

**compensation of employees** Includes wages, salaries, and various supplements—employer contributions to social insurance and pension funds, for example—paid to households by firms and by the government.

**proprietors' income** The income of unincorporated businesses.

**rental income** The income received by property owners in the form of rent.

**corporate profits** The income of corporations.

# Calculating GDP

## The Income Approach

**net interest** The interest paid by business.

**indirect taxes minus subsidies** Taxes such as sales taxes, customs duties, and license fees less subsidies that the government pays for which it receives no goods or services in return.

**net business transfer payments** Net transfer payments by businesses to others.

**surplus of government enterprises** Income of government enterprises.

# Calculating GDP

## The Income Approach

**TABLE 21.3 National Income, 2009**

	<b>Billions of Dollars</b>	<b>Percentage of National Income</b>
<b>National income</b>	12,280.0	100.0
Compensation of employees	7,783.5	63.4
Proprietors' income	1,041.0	8.5
Rental income	268.1	2.2
Corporate profits	1,308.9	10.7
Net interest	788.2	6.4
Indirect taxes minus subsidies	964.3	7.9
Net business transfer payments	134.1	1.1
Surplus of government enterprises	−8.1	−0.1

# Calculating GDP

## The Income Approach

**net national product (NNP)** Gross national product minus depreciation; a nation's total product minus what is required to maintain the value of its capital stock.

**statistical discrepancy** Data measurement error.

**personal income** The total income of households.

# Calculating GDP

## The Income Approach

**TABLE 21.4 GDP, GNP, NNP, and National Income, 2009**

	Dollars (Billions)
<b>GDP</b>	<b>14,256.3</b>
Plus: Receipts of factor income from the rest of the world	+589.4
Less: Payments of factor income to the rest of the world	<u>-484.5</u>
Equals: <b>GNP</b>	<b>14,361.2</b>
Less: Depreciation	<u>-1,864.0</u>
Equals: <b>Net national product (NNP)</b>	<b>12,497.2</b>
Less: Statistical discrepancy	<u>-217.3</u>
Equals: <b>National income</b>	<b>12,280.0</b>

# Calculating GDP

## The Income Approach

**disposable personal income or after-tax income** Personal income minus personal income taxes. The amount that households have to spend or save.

**personal saving** The amount of disposable income that is left after total personal spending in a given period.

**personal saving rate** The percentage of disposable personal income that is saved. If the personal saving rate is low, households are spending a large amount relative to their incomes; if it is high, households are spending cautiously.

# Calculating GDP

## The Income Approach

**TABLE 21.5 National Income, Personal Income, Disposable Personal Income, and Personal Saving, 2009**

	Dollars (Billions)
<b>National income</b>	<b>12,280.0</b>
Less: Amount of national income not going to households	<u>-261.0</u>
Equals: <b>Personal income</b>	12,019.0
Less: Personal income taxes	<u>-1,101.7</u>
Equals: <b>Disposable personal income</b>	10,917.3
Less: Personal consumption expenditures	-10,089.1
Personal interest payments	-213.9
Transfer payments made by households	<u>-155.7</u>
Equals: <b>Personal saving</b>	458.6
<b>Personal saving as a percentage of disposable personal income:</b>	4.2%

# ECONOMICS IN PRACTICE

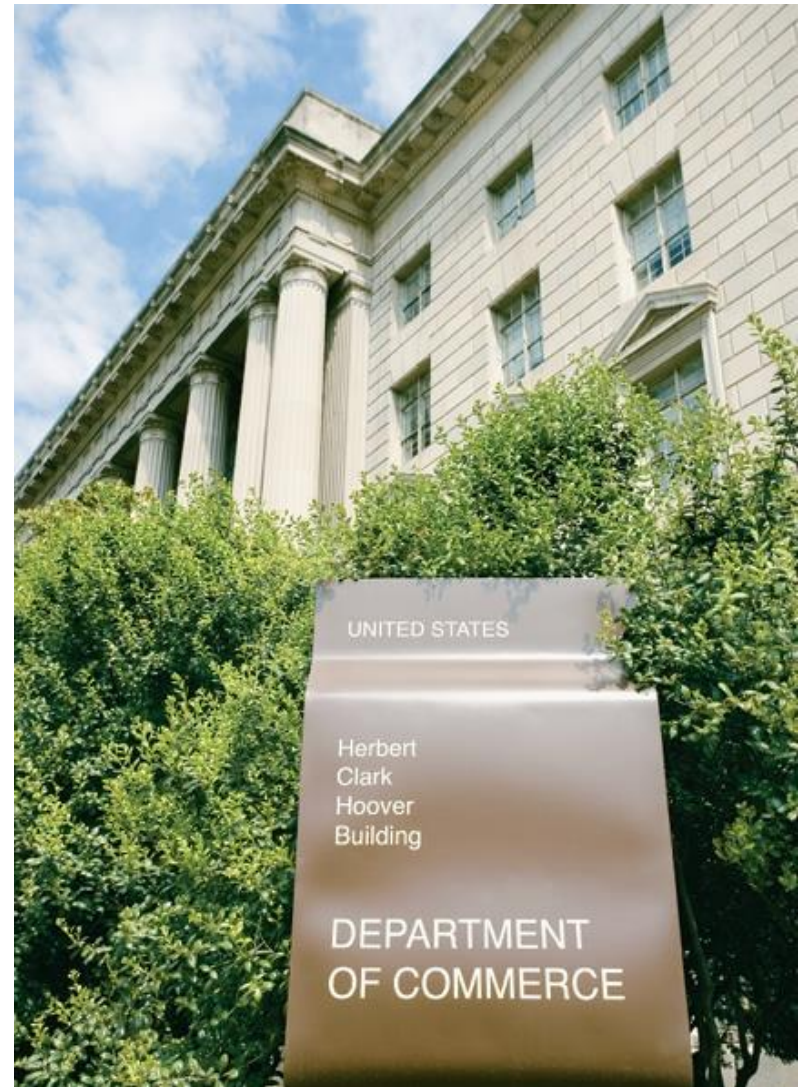
## GDP: One of the Great Inventions of the 20th Century

GDP! The right concept of economy-wide output, accurately measured.

The U.S. and the world rely on it to tell where we are in the business cycle and to estimate long-run growth.

It is the centerpiece of an elaborate and indispensable system of social accounting, the national income and product accounts.

This is surely the single most innovative achievement of the Commerce Department in the 20th century.





## Nominal versus Real GDP

**current dollars** The current prices that we pay for goods and services.

**nominal GDP** Gross domestic product measured in current dollars.

**weight** The importance attached to an item within a group of items.

# Nominal versus Real GDP

## Calculating Real GDP

**TABLE 21.6 A Three-Good Economy**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					GDP in Year 1 in Year 1 Prices $P_1 \times Q_1$	GDP in Year 2 in Year 1 Prices $P_1 \times Q_2$	GDP in Year 1 in Year 2 Prices $P_2 \times Q_1$	GDP in Year 2 in Year 2 Prices $P_2 \times Q_2$
	Production Year 1 $Q_1$	Year 2 $Q_2$	Price Per Unit Year 1 $P_1$	Year 2 $P_2$				
Good A	6	11	\$0.50	\$0.40	\$3.00	\$5.50	\$2.40	\$4.40
Good B	7	4	0.30	1.00	2.10	1.20	7.00	4.00
Good C	10	12	0.70	0.90	<u>7.00</u>	<u>8.40</u>	<u>9.00</u>	<u>10.80</u>
Total					\$12.10	\$15.10	\$18.40	\$19.20
					Nominal GDP in year 1			Nominal GDP in year 2

# Nominal versus Real GDP

## Calculating Real GDP

**base year** The year chosen for the weights in a fixed-weight procedure.

**fixed-weight procedure** A procedure that uses weights from a given base year.

# Nominal versus Real GDP

## Calculating the GDP Deflator

Policy makers not only need good measures of how real output is changing but also good measures of how the overall price level is changing.

The GDP deflator is one measure of the overall price level.

# Nominal versus Real GDP

## The Problems of Fixed Weights

Many structural changes have taken place in the U.S. economy in the last 40 to 50 years.

The use of fixed-price weights does not account for the responses in the economy to supply shifts.

The fixed-weight procedure ignores the substitution away from goods whose prices are increasing and toward goods whose prices are decreasing or increasing less rapidly.

# Limitations of the GDP Concept

## GDP and Social Welfare

If crime levels went down, society would be better off, but a decrease in crime is not an increase in output and is not reflected in GDP.

An increase in leisure is also an increase in social welfare, sometimes associated with a *decrease* in GDP.

Most nonmarket and domestic activities, such as housework and child care, are not counted in GDP even though they amount to real production.

GDP also has nothing to say about the distribution of output among individuals in a society.

# Limitations of the GDP Concept

## The Underground Economy

**underground economy** The part of the economy in which transactions take place and in which income is generated that is unreported and therefore not counted in GDP.

# Limitations of the GDP Concept

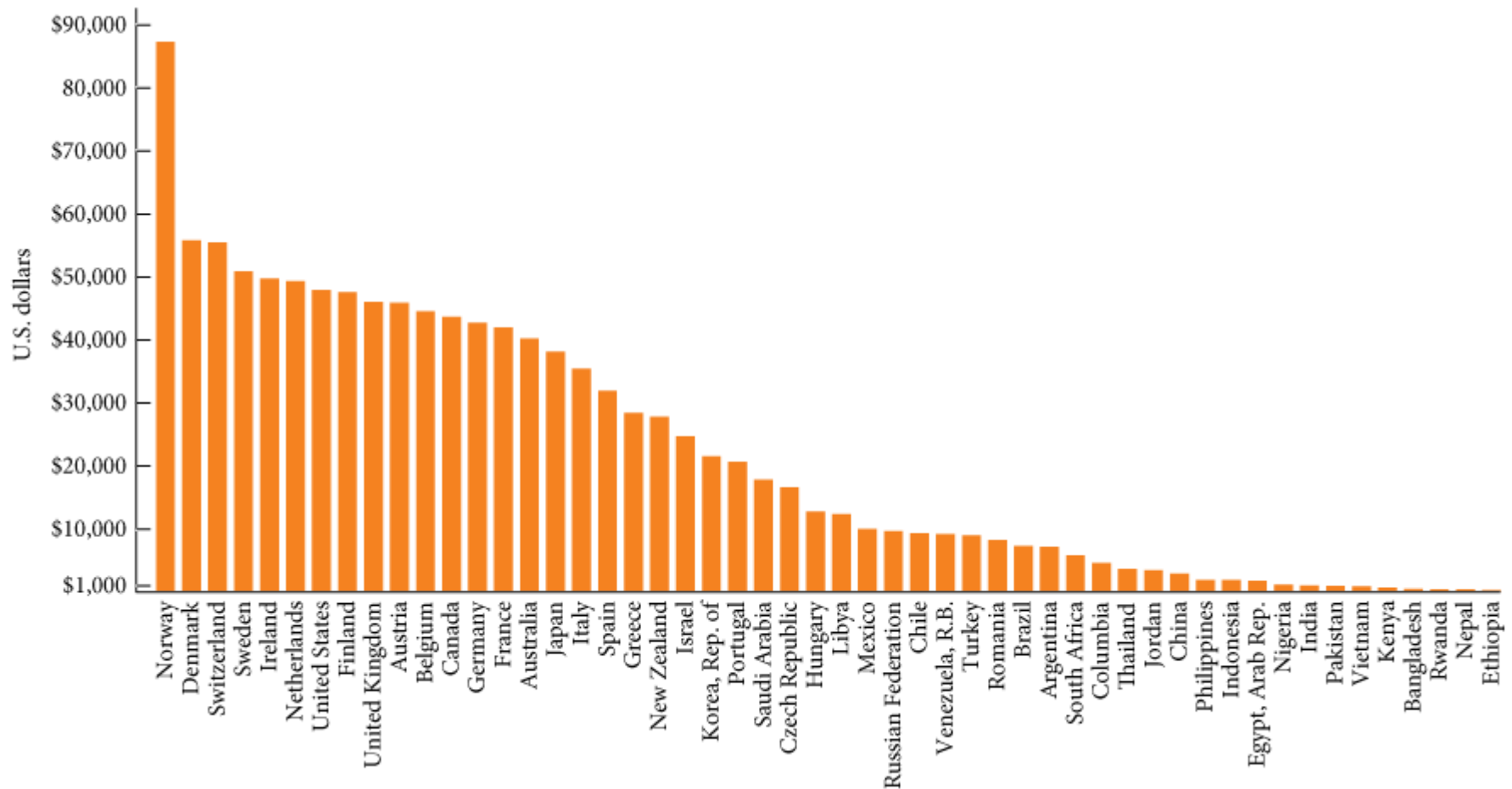
## Gross National Income per Capita

**gross national income (GNI)** GNP converted into dollars using an average of currency exchange rates over several years adjusted for rates of inflation.



# Limitations of the GDP Concept

## Gross National Income per Capita



▲ **FIGURE 21.1** Per Capita Gross National Income for Selected Countries, 2008

## Looking Ahead

This chapter has introduced many key variables in which macroeconomists are interested, including GDP and its components.

There is much more to be learned about the data that macroeconomists use.

In the next chapter, we will discuss the data on employment, unemployment, and the labor force.

In later chapters, we will discuss the data on money and interest rates.

Finally, we will discuss in more detail the data on the relationship between the United States and the rest of the world.

# REVIEW TERMS AND CONCEPTS

base year	gross domestic product (GDP)
change in business inventories	gross investment
compensation of employees	gross national income (GNI)
corporate profits	gross national product (GNP)
current dollars	gross private domestic investment ( <i>I</i> )
depreciation	income approach
disposable personal income, <i>or</i> after-tax income	indirect taxes minus subsidies
durable goods	intermediate goods
expenditure approach	national income
final goods and services	national income and product accounts
fixed-weight procedure	net business transfer payments
government consumption and gross investment ( <i>G</i> )	

# REVIEW TERMS AND CONCEPTS

net exports ( $EX - IM$ )

net interest

net investment

net national product (NNP)

nominal GDP

nondurable goods

nonresidential investment

personal consumption expenditures ( $C$ )

personal income

personal saving

personal saving rate

proprietors' income

rental income

residential investment

services

statistical discrepancy

surplus of government enterprises

underground economy

value added

weight

Expenditure approach to GDP:  $GDP = C + I + G + (EX - IM)$

$GDP = \text{Final sales} + \text{Change in business inventories}$

$\text{Net investment} = \text{Capital end of period} - \text{Capital beginning of period}$