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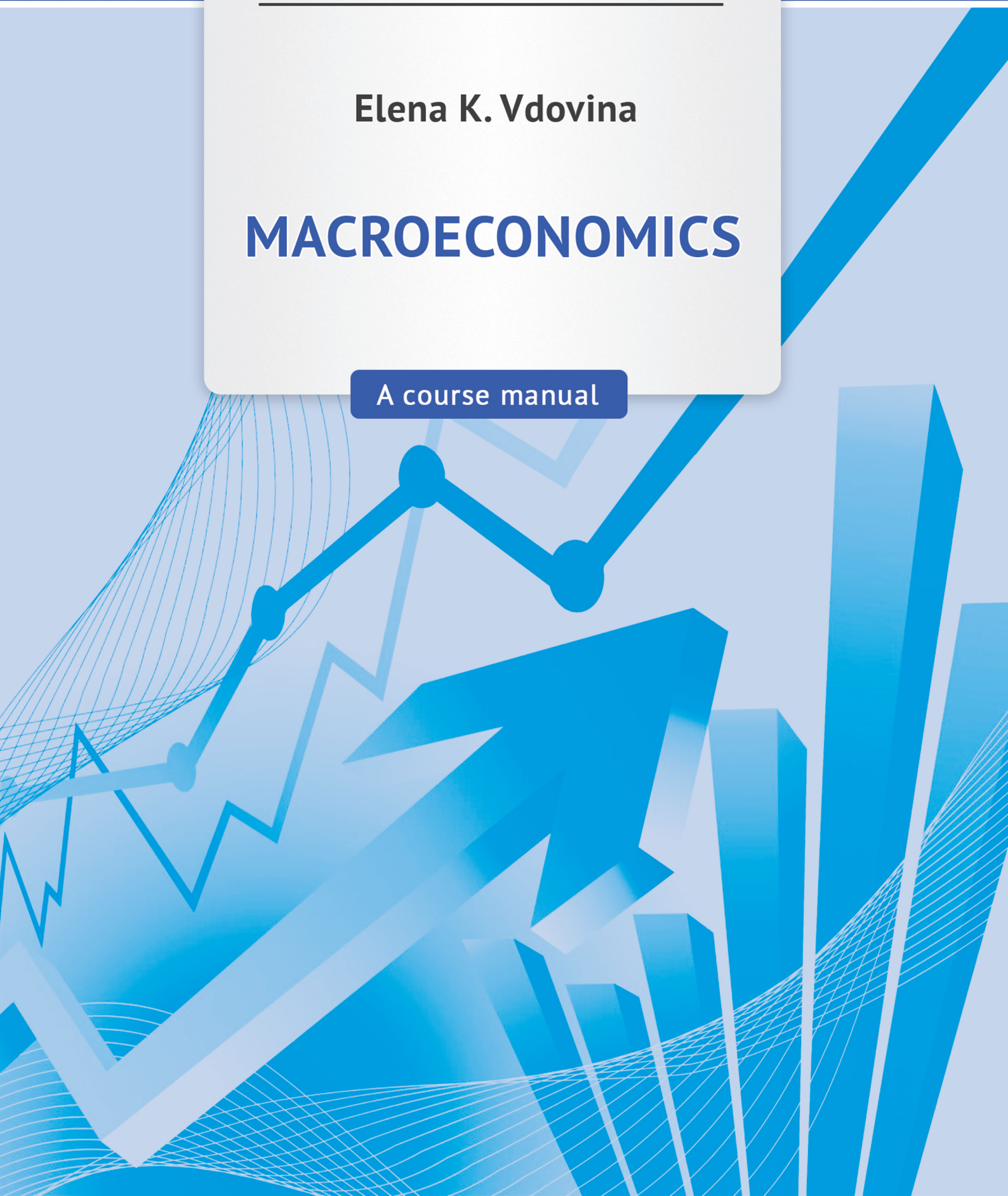
MACROECONOMICS

A course manual



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Р е ц е н з е н т – доктор экономических наук, доцент,
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В пособии рассмотрены основные вопросы макроэкономической теории и экономической политики, изложенные в соответствии с действующими в СПбПУ образовательными стандартами. Представлены такие темы, как система национальных счетов, моделирование макроэкономического равновесия на рынке благ и денег, макроэкономическая нестабильность, платежный баланс и валютный курс. В конце разделов имеются тесты и тематические задачи для закрепления нового материала. Целью учебного пособия является содействие в формировании экономического мышления студентов.

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University

Saint Petersburg
2021

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The course manual considers the main issues of the macroeconomic theory and economic policy, set out in accordance with the educational standards in force at SPbPU. Topics such as the system of national accounts, modeling of macroeconomic equilibrium in the market of goods and money, macroeconomic instability, the balance of payments and the exchange rate are presented. At the end of the sections, there are tests and numerical tasks for consolidation. The purpose of the course manual is to assist in the formation of students' economic thinking.

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CHAPTER 1. THE SYSTEM OF MACROECONOMIC VARIABLES

UNIT 1.1 The Circular Flow of Goods and Incomes. GDP and its Components

Learning objectives

1. Distinguish between microeconomics and macroeconomics.
2. Define gross domestic product and its four major components, and illustrate the various flows using the circular flow model.
3. Distinguish between nominal GDP and real GDP.
4. Learn how to measure GDP as the sum of the values of final goods and services and as the sum of values added at each stage of production.
5. Explain how to convert nominal values to real values.

Microeconomics versus Macroeconomics

Microeconomics is the branch of economics that focuses on the choices made by individual decision-making units in the economy – typically consumers and firms – and the impacts those choices have on individual markets. An economy, or economic system, is the people, companies, government, institutions and organisations that interact to determine the allocation and use of resources. Macroeconomics is the study of what is happening to the economy as a whole. It is concerned with aggregate demand and aggregate supply. By ‘aggregate demand’ we mean the total amount of spending in the economy. By ‘aggregate supply’ we mean the total national output of goods and services.

Macroeconomics looks for answers to the following questions: Is the total level of economic activity rising or falling? Is the rate of inflation increasing or decreasing? What is happening to the unemployment rate? These are questions that deal with aggregates, or totals, in the economy; they are problems of macroeconomics.

To determine whether the economy of a nation is growing or shrinking in size, economists use a measure of total output called real GDP. Real GDP, short for real Gross Domestic Product, is the total value of all final goods and services produced during a particular year or period, adjusted to eliminate the effects of changes in prices. Let us break that definition up into parts.

Notice that only 'final' goods and services are included in GDP. Many goods and services are purchased for use as inputs in producing something else. For example, a pizza shop buys flour to make pizzas. If we counted the value of the flour and the value of the pizza, we would end up counting the flour twice and thus overstating the value of total production. Including only final goods avoids **double-counting**. If the flour is produced during a particular period but has not been sold, then it is a 'final good' for that period and is counted. Another approach to estimating the value of final production is to estimate for each stage of production the value added, the issue which we consider later in this unit.

Suppose we want to determine whether the economy's output is growing or shrinking. If each final good or service produced were valued at its current market price, and then we were to add the values of all such items produced, we would not know if the total had changed because output changed or because prices changed or both. To isolate the behavior of total output only, we must hold prices constant at some level. For example, if we measure the value of a product output over time using a base-year price, the year to which we compare the variables, then only an increase in the number of products could increase the value of total output. By making such an adjustment for all goods and services, we obtain a value for **real GDP**. In contrast, **nominal GDP** is the total value of final goods and services for a particular period valued in terms of prices for that period, or current prices.

GDP is the total value of all final goods and services produced during a particular period valued at prices in that period. We can divide the goods and services produced during any period into four broad components, based on who buys them. These components of GDP are personal consumption (*C*), gross private domestic investment (*I*), government purchases (*G*), and net exports (*X*n).

$$\mathbf{GDP = C + I + G + Xn}$$

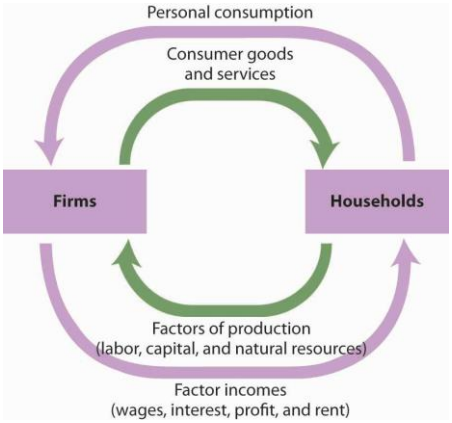
1.Personal Consumption

Personal consumption is a flow variable that measures the value of goods and services purchased by households during a time period. Purchases by households of

groceries, health-care services, clothing, and automobiles — all are counted as consumption.

Personal consumption represents a demand for goods and services placed on firms by households. Figure 1.1 *Personal Consumption in the Circular Flow* presents a circular flow model for an economy that produces only personal consumption goods and services. We will add the other components of GDP to the circular flow as we discuss them. Spending for these goods flows from households to firms; it is the arrow labeled 'Personal consumption'. Firms produce these goods and services using factors of production: labor, capital, and natural resources. These factors are ultimately owned by households. The production of goods and services thus generates income to households; we see this income as the flow from firms to households labeled 'Factor incomes'.

Figure 1.1 *Personal Consumption in the Circular Flow*



2. Private Investment

The term '*investment*' can generate confusion. In everyday conversation, we use the term '*investment*' to refer to uses of money to earn income. We say we have invested in a company's shares. Economists, however, restrict '*investment*' to activities that increase the economy's stock of capital, or simply capital, one of the factors of production.

Gross private domestic investment**,** often simply referred to as 'private investment' is the value of all goods produced during a period for use in the production of other goods and services. Like personal consumption, private

investment is a flow variable. A hammer produced for a carpenter is private investment. A printing press produced for a magazine publisher is private investment, as is a conveyor-belt system produced for a manufacturing firm. Building a house or a bloc of flats is private investment.

Private investment includes three flows that add to or maintain the nation's capital stock:

1. expenditures by business firms on new buildings, plants, tools, equipment, and software that will be used in the production of goods and services;
2. expenditures on new residential housing;
3. changes in business inventories. Any addition to a firm's inventories represents an addition to investment; a reduction subtracts from investment. For example, if a clothing store stocks 1,000 pairs of jeans, the jeans represent an addition to inventory and are part of gross private domestic investment. As the jeans are sold, they are subtracted from inventory and thus subtracted from investment.

Despite its relatively small share of total economic activity, private investment plays a crucial role in the macroeconomy for two reasons:

1. Private investment adds to the economy's capacity to produce and shifts its production possibilities curve outward. Investment is thus one determinant of economic growth, which is explored in another chapter.
2. Private investment is a relatively volatile component of GDP; it can change dramatically from one year to the next. Fluctuations in GDP are often driven by fluctuations in private investment.

Private investment represents a demand placed on firms for the production of capital goods. While it is a demand placed on firms, it flows from firms to other firms. The production of goods and services for consumption generates factor incomes to households; the production of capital goods for investment generates income to households as well.

3.Government Purchases

Government agencies at all levels purchase goods and services from firms. They purchase office equipment, vehicles, buildings, services, and so on. Many

government agencies also produce goods and services. Police departments produce police protection. Public schools produce education. Government purchases are the sum of purchases of goods and services from firms by government agencies plus the total value of output produced by government agencies themselves during a time period.

Since government spending is a large component of aggregate demand, and since taxes affect the amount households and companies have for spending, government spending and taxation decisions have major effects on aggregate demand and aggregate supply.

Government purchases are not the same thing as government spending. Much government spending takes the form of transfer payments, which are payments that do not require the recipient to produce a good or service in order to receive them. Transfer payments include Social Security and other types of assistance to retired people, welfare payments to poor people, and unemployment compensation to people who have lost their jobs. Transfer payments do not count in a nation's GDP, because they do not reflect the production of a good or service.

Government purchases represent a demand placed on firms and add to the demand created by consumers. Like all the components of GDP, the production of goods and services for government agencies creates factor incomes for households.

4.Net Exports

Sales of a country's goods and services to buyers in the rest of the world during a particular time period represent its exports. A purchase by a Japanese buyer of a Ford produced in the United States is a U.S. export. Imports are purchases of foreign-produced goods and services by a country's residents during a period. Subtracting imports from exports yields net exports.

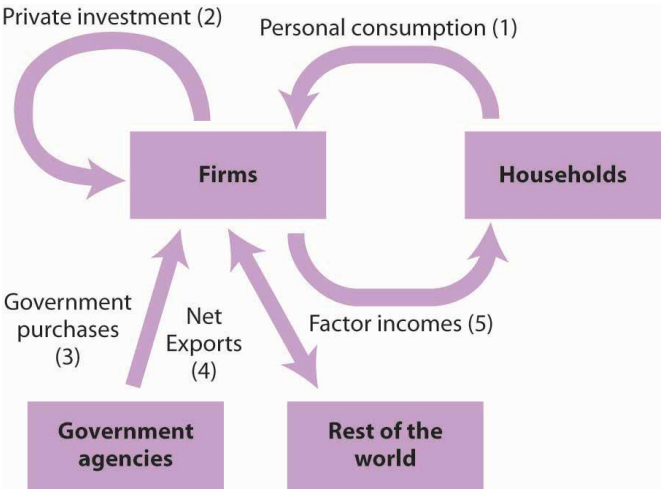
$$\text{Exports } (X) - \text{imports } (M) = \text{net exports } (Xn)$$

Net exports can be positive or negative. Negative net exports constitute a **trade deficit**. The amount of the deficit is the amount by which imports exceed exports. When exports exceed imports, there is a **trade surplus**.

A nation's GDP

The production of goods and services for personal consumption, private investment, government purchases, and net exports makes up a nation's GDP. Firms produce these goods and services in response to demands from households (personal consumption), from other firms (private investment), from government agencies (government purchases), and from the rest of the world (net exports). All of this production creates factor income for households. Figure 1.2 *Spending in the Circular Flow Model* shows the circular flow model for all the spending flows discussed.

Figure 1.2 *Spending in the Circular Flow Model*



The circular flow model identifies some of the forces at work in the economy, forces that we will be studying in later chapters. For example, an increase in any of the flows that place demands on firms (personal consumption, private investment, government purchases, and exports) will induce firms to expand their production. An increase in production will require firms to employ more factors of production, which will create more income for households. Households are likely to respond with more consumption, which will induce still more production, more income, and still more consumption. Similarly, a reduction in any of the demands placed on firms will lead to a reduction in output, a reduction in firms' use of factors of production, a reduction in household incomes, a reduction in income, and so on. Both sequences of events are characteristic of the economic dynamics called the business cycle, which will study later.

The flow diagram can help us to distinguish between micro- and macroeconomics. Microeconomics is concerned with the composition of the circular flow: what combinations of goods make up the goods flow; how various factors of production are combined to produce these goods; for whom the wages, dividends, rent and interest are paid out. The circular flow of goods and income also make it clear why the GDP can be measured in three ways: (a) the value of final goods and services produced, (b) the value of factors of production supplied, (c) the value of spending on goods and services.

Final Goods and Value Added

GDP is the total value of all *final* goods and services produced during a particular period valued at prices in that period. That is not the same as the total value of all goods and services produced during a period. This distinction gives us another method of estimating GDP in terms of output.

Suppose, for example, that a logger cuts some trees and sells the logs to a sawmill. The mill makes lumber and sells it to a construction firm, which builds a house. The market price for the lumber includes the value of the logs; the price of the house includes the value of the lumber. If we try to estimate GDP by adding the value of the logs, the lumber, and the house, we would be counting the lumber twice and the logs three times. This problem is called **'double counting'**, and the economists who compute GDP seek to avoid it.

Another approach to estimating the value of final production is to estimate for each stage of production the value added, the amount by which the value of a firm's output exceeds the value of the goods and services the firm purchases from other firms. Figure 1.3 *Final Value and Value Added* illustrates the use of value added in the production of a house.

Figure 1.3 *Final Value and Value Added*

Good	**Produced by**	**Purchased by**	**Price**	**Value Added**
Logs	Logger	Sawmill	$12,000	$12,000
Lumber	Sawmill	Construction firm	$25,000	$13,000

Good	Produced by	Purchased by	Price	Value Added
House	Construction firm	Household	$125,000	$100,000
		Final Value	**$125,000**	
		Sum of Values Added		**$125,000**

If we sum the value added at each stage of the production of a good or service, we get the final value of the item. The example shown here involves the construction of a house, which is produced from lumber that is, in turn, produced from logs.

Suppose the logs produced by the logger are sold for $12,000 to a mill, and that the mill sells the lumber it produces from these logs for $25,000 to a construction firm. The construction firm uses the lumber to build a house, which it sells to a household for $125,000. The value of the final product, the house, is $125,000. The value added at each stage of production is estimated as follows:

a. The logger adds $12,000 by cutting the logs.

b. The mill adds $13,000 ($25,000 − $12,000) by cutting the logs into lumber.

c. The construction firm adds $100,000 ($125,000 − $25,000) by using the lumber to build a house.

The sum of values added at each stage ($12,000 + $13,000 + $100,000) equals the final value of the house, $125,000.

The value of an economy's output in any period can thus be estimated in either of two ways. The values of final goods and services produced can be added directly, or the values added at each stage in the production process can be added.

Gross National Product (GNP)

While GDP represents the most commonly used measure of an economy's output, economists sometimes use an alternative measure. **Gross National Product** (GNP) is the total value of final goods and services produced during a particular period with factors of production owned by the residents of a particular country regardless of the location of production facilities, in the home economy or abroad.

The difference between GDP and GNP is a subtle one. The GDP of a country equals the value of final output produced within the borders of that country; the GNP of a country equals the value of final output produced using factors owned by residents of the country. Most production in a country employs factors of production owned by residents of that country, so the two measures overlap. Differences between the two measures emerge when production in one country employs factors of production *owned* by residents of other countries.

Suppose, for example, that a resident of Washington owns and operates a watch repair shop in Canada. The value of watch repair services produced at the shop would be counted as part of Canada's GDP because they are produced in Canada. That value would not, however, be part of U.S. GDP. But, because the watch repair services were produced using capital and labor provided by a resident of the United States, they would be counted as part of GNP in the United States and not as part of GNP in Canada.

Because most production fits in both a country's GDP as well as its GNP, there is seldom much difference between the two measures. The relationship between GDP and GNP is given by

GDP + net factor income received from abroad by residents of a nation = GNP

The Implicit Price Deflator

Values for nominal and real GDP, described earlier in this chapter, provide us with the information to calculate the most broad-based price index available. The **implicit price deflator**, a price index for all final goods and services produced, also known as the Paasche index is the ratio of nominal GDP to real GDP.

In computing the implicit price deflator for a particular period, economists define the market basket quite simply: it includes all the final goods and services produced during that period (consumer goods and investment goods). The nominal GDP gives the current cost of that basket; the real GDP adjusts the nominal GDP for changes in prices. Nominal GDP can be converted to real GDP using an implicit price deflator.

The implicit price deflator equals nominal GDP divided by real GDP:

$$P_P = \frac{\sum(p_{c,t_n}) * (q_{c,t_n})}{\sum(p_{c,t_0}) * (q_{c,t_n})}$$

, where $P_{c,tn}$ and $Q_{c,tn}$ represent the current year t_n; $P_{c,t0}$ are the prices of base year t_0.

Thus the numerator shows the value of goods sold in the current year (Nominal GDP). The denominator shows the value of goods sold in the current year $Q_{c,tn}$ at the prices of the base year $P_{c,t0}$ (Real GDP).

For example, in 2007, nominal GDP in the United States was $13,807.5 billion, and real GDP was $11,523.9 billion. Thus, the implicit price deflator was $13,807.5 / $11,523.9 = 1.198. Following the convention of multiplying price indexes by 100, the published number for the implicit price deflator was 119.8.

The price deflator is also used to measure economic processes over time. The price deflator of the base year to which we compare the situation in the current year, equals 1.00. If the deflator is more than 1.00, we suppose that the price level is currently higher than it was in the base year. To conclude, the price deflator can be used as our measure of the price level in the economy as a whole.

Key concepts

- **Nominal gross domestic product** (**GDP)** is the total value of final goods and services for a particular period valued in terms of prices for that period.
- **Real gross domestic product** (**real GDP**) is a measure of the value of all final goods and services produced during a particular year or period, adjusted to eliminate the effects of price changes.
- **GDP** is the sum of final goods and services produced for consumption (*C*), private investment (*I*), government purchases (*G*), and net exports (*X*n). Thus GDP = *C* + *I* + *G* + *X*n.
- GDP plus net factor income received from abroad equals **Gross National Product** (**GNP)**.
- GDP can be viewed in the context of the **circular flow model**. Consumption goods and services are produced in response to demands from households;

investment goods are produced in response to demands for new capital by firms; government purchases include goods and services purchased by government agencies; and net exports equal exports less imports.

- **Total output** can be measured in two ways: as the sum of the values of final goods and services produced and as the sum of values added at each stage of production.
- The **implicit price deflator**, a price index for all final goods and services produced, is the ratio of nominal GDP to real GDP. Nominal GDP can be converted to real GDP using an implicit price deflator.

UNIT 1.2 Gross Domestic Income and its components

Learning objectives

1. Define gross domestic income and explain its relationship to gross domestic product.
2. Discuss the components of gross domestic income.
3. Define disposable personal income and explain how to calculate it from GDP

We saw in the last section that the production of goods and services generates factor incomes to households. The production of a given value of goods and services generates an equal value of total income. **Gross domestic income (GDI)** equals the total income generated in an economy by the production of final goods and services during a particular period. It is a flow variable. Because an economy's total output equals the total income generated in producing that output, GDP = GDI. We can estimate GDP either by measuring total output or by measuring total income.

The Components of GDI

There are six components of the GDI:

1. Employee compensation
2. Profits
3. Rental income
4. Net Interest
5. Depreciation
6. Indirect Taxes

Employee compensation is the largest among the components of factor income. Factor income also includes profit, rent, and interest. In addition, GDI includes charges for depreciation and taxes associated with production. Depreciation and production-related taxes, such as sales taxes, make up part of the cost of producing goods and services and must be accounted for in estimating GDI. We will discuss each of these components of GDI next.

1. **Employee compensation** in the form of wages, salaries, and benefits makes up the largest single component of income generated in the production of GDP. In the developed economies this component can represent more than 50% of GDI.

The structure of employee compensation has changed dramatically in the last several decades. For example, in the USA in 1950, virtually all employee compensation 95% of it came in the form of wages and salaries. The remainder, about 5%, came in the form of additional benefits such as employer contributions to retirement programs and health insurance. In 2008, the share of benefits was almost 20% of total employee compensation.

2. The **profit** component of income earned by firms and households equals total revenues of firms less costs as measured by conventional accounting. Profits are the reward the owners of firms receive for being in business. The opportunity to earn profits is the driving force behind production in a market economy.

Using the USA as an example, profits amounted to more than 15% of GDI in 2008, down sharply from five decades earlier, when profits represented about 25% of the income generated in GDI.

3. **Rental income**, such as the income earned by owners of rental housing or payments for the rent of natural resources, is the smallest component of GDI (less than 1%); it is the smallest of the income flows to households. The meaning of rent in the computation of GDI is the same as its meaning in conventional usage; it is a charge for the temporary use of some capital asset or natural resource.

4. **Net Interest**. Businesses both receive and pay interest. GDI includes net interest, which equals interest paid less interest received by domestic businesses, plus

interest received from foreigners less interest paid to foreigners. In 2008 net interest accounted for over 6% of USA GDI.

5. **Depreciation**. Depreciation is a measure of the amount of capital that wears out or becomes obsolete during a period. Over time the machinery and buildings that are used to produce goods and services wear out or become obsolete. A farmer's tractor, for example, wears out as it is used. A technological change may make some equipment obsolete. The introduction of personal computers, for example, made the electric typewriters used by many firms obsolete. Depreciation is referred to in official reports as the consumption of fixed capital.

Depreciation is a cost of production, so it represents part of the price charged for goods and services. It is therefore counted as part of the income generated in the production of those goods and services.

6. **Indirect Taxes**. The final component of the income measure of GDI is indirect business taxes. Indirect taxes are taxes imposed on the production or sale of goods and services or on other business activity. (By contrast, a direct tax is a tax imposed directly on income; the personal income and corporate income taxes are direct taxes.) Indirect taxes, which include sales and excise taxes and property taxes, make up part of the cost to firms of producing goods and services. Like depreciation, they are part of the price of those goods and services and are therefore treated as part of the income generated in their production.

Distinguishing GDP and GDI

Figure 1.4 *GDP and GDI* shows the components of GDI in 2008. Employee compensation represented the largest share of GDI. In principle, GDP and GDI should be equal, but their estimated values never are, because the data come from different sources. Output data from a sample of firms are used to estimate GDP, while income data from a sample of households are used to estimate GDI. The difference is the statistical discrepancy shown in the right-hand column of Figure 1.4.

The figure shows the composition of GDP and GDI in the third quarter of 2008 (in billions of dollars at an annual rate). Notice the rough equality of the two measures. They are not quite equal because of measurement errors; the difference is

due to a statistical discrepancy and is reduced significantly over time as the data are revised.

Figure 1.4 *GDP and GDI*

Gross Domestic Product	**$14,420.5**	**Gross Domestic Income**	**$14,260.0**
1. Personal Consumption	10,169.5	1. Compensation of Employees	8,089.8
2. Private Investment	2,013.6	2. Profits	2,226.7
3. Government consumption	2,943.9	3. Rental income of persons	63.1
4. Net exports of goods and services	–706.5	4. Net interest	903.8
		5. Taxes on production and imports	1,076.9
		6. Depreciation	1,899.7
		Statistical discrepancy	160.5

Tracing Income from the Economy to Households

We have seen that the production of goods and services generates income for households. Thus, the value of total output equals the value of total income in an economy. But we have also seen that our measure of total income, GDI, includes such things as depreciation and indirect business taxes that are not actually received by households. Households also receive some income, such as transfer payments, that does not count as part of GDP or GDI. Because the income households actually receive plays an important role in determining their consumption, it is useful to examine the relationship between a nation's total output and the income households actually receive.

Figure 1.5 *From GDP to Disposable Personal Income* traces the path we take in going from GDP to disposable personal income (DPI), which equals the income households have available to spend on goods and services. Disposable personal income is either spent for personal consumption or saved by households.

Figure 1.5 *From GDP to Disposable Personal Income*

Gross national product (GNP)	=	GDP (+) net factor earnings from abroad
Net national product (NNP)	=	GNP (−) depreciation

National income (NI)	=	NNP (−) statistical discrepancy
Personal income (PI)	=	NI (−) income earned but not received [taxes on production and imports, social security, corporate profit taxes] (+) transfer payments
Disposable personal income (DPI)	=	PI (−) personal income taxes

GDP, a measure of total output, equals GDI, the total income generated in the production of goods and services in an economy. The chart traces the path from GDP to DPI, which equals the income households actually receive. We first convert GDP to GNP. Then, we subtract depreciation to obtain net national product and subtract the statistical discrepancy to arrive at national income. Next, we subtract components of GNP and GNI that do not represent income actually received by households, such as taxes on production and imports, corporate profit and payroll taxes (contributions to social insurance). We add items such as transfer payments that are income to households but are not part of GNP and GNI.

Per capita real GDP or GNP can be used to compare the standards of living in different countries. Thus in international comparisons of economic well-being, economists generally make comparisons not of real GNP or GDP but of per capita real GNP or GDP, which equals a country's real GNP or GDP divided by its population. There is a huge gap between per capita income in one of the poorest countries in the world, Liberia, and wealthier nations such as the United States and Luxembourg. The disparities in income are striking; Luxembourg, the country with the highest per capita real GNP, had an income level more than 200 times greater than Liberia, the country with the lowest per capita real GNP.

Key concepts

- Gross domestic product, GDP, equals gross domestic income, **GDI**, which includes compensation, profits, rental income, indirect taxes, and depreciation.
- We can use GDP, a measure of total output, to compute **DPI**, a measure of income received by households and available for them to spend.
- **Per capita real GDP** can be used to compare economic well-being and the standards of living in different countries.

Chapter 1. A Multiple Choice Test

1. Gross domestic product (GDP) is:

a) the sum of all goods and services produced;

b) the sum of all goods and services sold;

c) the amount of all final goods and services produced;

d) the market value of all final goods and services produced.

2. Nominal GNP is the value of goods and services, measured:

a) at current prices;

b) in real prices;

c) in the prices of the base period;

d) in the prices of the previous period.

3. GNP Deflator:

a) is equal to the ratio of nominal GNP to real GNP;

b) is equal to the ratio of real GNP to nominal GNP;

c) decreases as inflation accelerates;

4. A Russian citizen works temporarily in the USA in an American private firm. His income is included:

a) in the USA's GNP and GDP;

b) in Russia's GDP and USA's GDP;

c) in Russia's GNP and the USA's GDP;

g) in Russia's GNP and the USA's GDP.

5. If real GDP fell by 6% and the population declined by 3% in the same year:

a) real GDP per capita decreased;

b) real GDP per capita increased;

c) nominal GDP has not changed;

d) nominal GDP decreased;

6. The British company's production of sneakers in Russia:

a) increases both GDP and GNP;

b) increase the UK's GDP;

c) increases the UK's GNP;

d) will not increase either of them.

7. The purchase of a new house by a family will affect the size of:

a) net exports;

b) public expenditure;

c) private investment;

d) expenses for the purchase of consumer durable goods.

8. What is not used in determining national income (NI)?

a) corporate profits;

b) transfer payments;

c) rental income;

d) salary.

9. What is personal disposable income?

a) accrued wages;

b) total income received (wages and other income));

c) real income;

d) total income received less tax and non-tax mandatory payments.

10. To move from gross national product (GNP) to net national product (NNP), we must:

a) add to net investment expenses;

b) deduct net investment from GNP;

c) deduct depreciation of fixed assets from GNP;

d) add depreciation to GNP.

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **Real output per capita:** In the USA in the third quarter of 2008 real GDP was $11,720 billion (annual rate). The U.S. population was 305.7 million. Compute the US real output per capita.

2. **Real output per capita:** From 1970 to 2004 Sierra Leone's population grew at an annual rate of 2.1% per year, while its real GDP grew at an annual rate of 1.4%. Compute the rate of change in the output per capita. How did the change effect the economic situation?

3. **Real output per capita:** From 1970 to 2004 Singapore's population grew at an annual rate of 2.1% per year, while its real GDP grew 7.4% per year. Compute the annual growth in output per capita. How did it affect Singapore, which used to be a relatively poor country in 1970? What place did Singapore take in the world in 2018 in terms of GDP per capita? Use the Internet resources to find out the answer.

4. **Real GDP:** Nominal GDP versus real GDP: Suppose that nominal GDP in the US was $10 trillion in 2003 and $11 trillion in 2004. Suppose that the implicit price deflator has gone from 1.063 in 2003 to 1.091 in 2004. 1) Compute real GDP in 2003 and in 2004.

5. **Price deflator:** In 2016, the nominal GDP in the US was $16,560 billion, and the real GDP was $13,800 billion. What was the price deflator in that year?

6. **Real GDP:** Suppose the GDP of Country X increased from $500 billion to $600 billion. The implicit price deflator increased from 125 to 150. How did it affect the value of real GDP?

7. **Real GDP:** The economy's GDP. Suppose you are given the following data for this economy (in millions of $):

- Personal consumption 1,000
- Home construction 100
- Increase in inventories 40
- Equipment purchases by firms 60
- Government purchases 100
- Social Security payments to households 40
- Government welfare payments 100
- Exports 50
- Imports 150

Compute the economy's GDP. What components from the list above are not included?

8. **Real GDP:** Compute GDI from the data below (in millions of $). Assume that GDP equals GNP for this problem (i.e. all factor incomes are earned and paid in the domestic economy).

Employee compensation	700
Social Security payments to households	40
Welfare payments	100
Profits	200
Rental income	50
Net interest	25
Depreciation	50
Indirect taxes	175

9. **Value added:** Suppose a dairy farm produces raw milk, which it sells for $1,000 to a dairy. The dairy produces cream, which it sells for $3,000 to an ice cream manufacturer. The ice cream manufacturer uses the cream to make ice cream, which it sells for $7,000 to a grocery store. The grocery store sells the ice cream to consumers for $10,000. Compute the value added at each stage of production, and compare this figure to the final value of the product produced. Report your results in the table below.

Goods	Produced by	Purchased by	Price	Value added
Milk				
Cream				
Ice cream				
		Final Value		
		Sum of Values Added		

10. **Real GDP:** What impact would each of the following have on real GDP?

1. On average, people in a country decide to increase the number of hours they work by 5%.
2. Spending on homeland security increases in response to a terrorist attack.
3. The price level and nominal GDP increase by 10%.

CHAPTER 2. AGGREGATE DEMAND AND AGGREGATE SUPPLY

UNIT 2.1 Aggregate Demand

Learning objectives

1. Define aggregate demand, represent it using a hypothetical aggregate demand curve, and identify and explain the three effects that cause this curve to slope downward.
2. Distinguish between a change in the aggregate quantity of goods and services demanded and a change in aggregate demand.
3. Use examples to explain how each component of aggregate demand can be a possible aggregate demand shifter.
4. Explain what a multiplier is and how to calculate it.

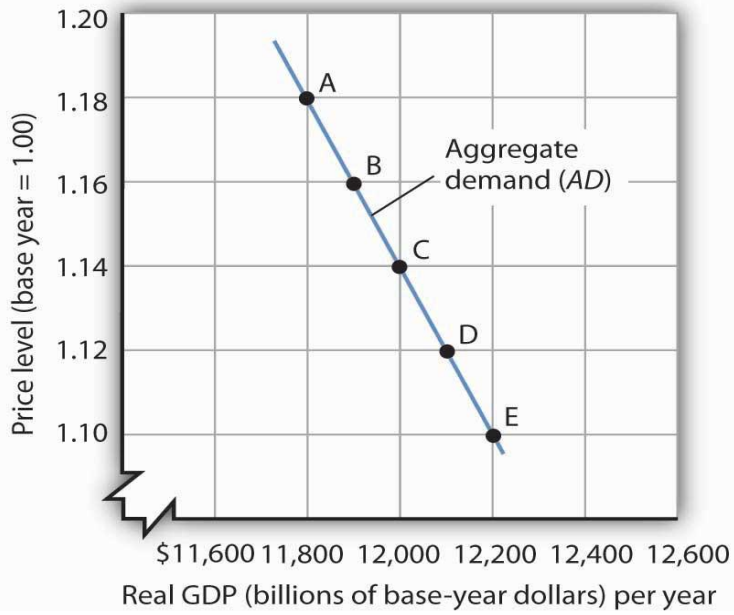
Firms face four sources of demand: households (personal consumption), other firms (investment), government agencies (government purchases), and foreign markets (net exports). **Aggregate demand** is the relationship between the total quantity of goods and services demanded (from all the four sources of demand) and the price level, all other determinants of spending unchanged. The *AD* curve is a graphical representation of aggregate demand

The Slope of the *AD* Curve

We will use the price deflator as our measure of the price level; the aggregate quantity of goods and services demanded is measured as real GDP. The table in Figure 2.1 *Aggregate Demand* gives values for each component of aggregate demand at each price level for a hypothetical economy. Various points on the *AD* curve are found by adding the values of these components at different price levels. The *AD* curve for the data given in the table is plotted on the graph. At point A, at a price level of 1.18, $11,800 billion worth of goods and services will be demanded; at point C, a reduction in the price level to 1.14 increases the quantity of goods and services demanded to $12,000 billion; and at point E, at a price level of 1.10, $12,200 billion will be demanded.

Figure 2.1 *Aggregate Demand*

Point on aggregate demand curve	Price level	$C+$	$I+$	$G+$	$X_n=$	Aggregate demand
A	1.18	8,400	1,820	2,150	−570	11,800
B	1.16	8,450	1,860	2,150	−560	11,900
C	1.14	8,500	1,900	2,150	−550	12,000
D	1.12	8,550	1,940	2,150	−540	12,100
E	1.10	8,600	1,980	2,150	−530	12,200



An *AD* curve shows the relationship between the total quantity of output demanded (measured as real GDP) and the price level (measured as the price deflator). At each price level, the total quantity of goods and services demanded is the sum of the components of real GDP, as shown in the table. There is a negative relationship between the price level and the total quantity of goods and services demanded, all other things unchanged.

The negative slope of the *AD* curve suggests that it behaves in the same manner as an ordinary demand curve. But we cannot apply the reasoning we use to explain downward-sloping demand curves in individual markets to explain the downward-sloping *AD* curve. Let us revise the two reasons for a negative relationship between price and quantity demanded in microeconomics. First, according to a substitution effect, lower price induces people to substitute more of the good whose price has fallen for other goods, increasing the quantity demanded. Second, according to an income effect, the lower price creates a higher real income. This normally increases quantity demanded further.

Neither of these effects is relevant to a change in prices in macroeconomics, which considered totals, or the aggregate. When we are dealing with the average of all prices – the price level – we can no longer say that a fall in prices will induce a change in relative prices that will lead consumers to buy more of the goods and services whose prices have fallen and less of the goods and services whose prices have not fallen. The price of corn may have fallen, but the prices of wheat, sugar, tractors, steel, and most other goods or services produced in the economy are likely to have fallen as well.

Furthermore, a reduction in the price level means that it is not just the prices consumers pay that are falling. It means the prices people receive – their wages, the rents they may charge as landlords, the interest rates they earn – are likely to be falling as well. A falling price level means that goods and services are cheaper, but incomes are lower, too. There is no reason to expect that a change in real income will boost the quantity of goods and services demanded – indeed, no change in real income would occur. If nominal incomes and prices all fall by 10%, for example, real incomes do not change.

Why, then, does the *AD* curve slope downward? Because of three effects.

1. Wealth effect. One reason for the downward slope of the aggregate demand curve lies in the relationship between real wealth (the stocks, bonds, and other assets that people have accumulated) and consumption (one of the four components of aggregate demand). When the price level falls, the real value of wealth increases – it has more purchasing power. For example, if the price level falls by 25%, then $10,000 of wealth could purchase more goods and services than it would have if the price level had not fallen. An increase in wealth will induce people to increase their consumption. The consumption component of aggregate demand will thus be greater at lower price levels than at higher price levels. The tendency for a change in the price level to affect real wealth and thus alter consumption is called the wealth effect; it suggests a negative relationship between the price level and the real value of consumption spending.

2. Interest rate effect (**Keynes effect**). A second reason the *AD* curve slopes downward lies in the relationship between interest rates and investment. A lower price level lowers the demand for money, because less money is required to buy a given quantity of goods. What economists mean by money demand will be explained in more detail in a later chapter. But, as we learned in studying demand and supply, a reduction in the demand for something, all other things unchanged, lowers its price. In this case, the 'something' is money and its price is the interest rate. A lower price level reduces demand for money, and interest rates fall. Lower interest rates make borrowing by firms to build factories or buy equipment and other capital more attractive. A lower interest rate means lower mortgage payments, which tends to increase investment in residential houses. Investment thus rises when the price level falls. The tendency for a change in the price level to affect the interest rate and thus to affect the quantity of investment demanded is called the interest rate effect. John Maynard Keynes, a British economist whose analysis of the Great Depression and what to do about it led to the birth of modern macroeconomics, emphasized this effect. For this reason, the interest rate effect is sometimes called the Keynes effect.

3. International trade effect. A third reason for the rise in the total quantity of goods and services demanded as the price level falls can be found in changes in the net export component of aggregate demand. All other things unchanged, a lower price level in an economy reduces the prices of its goods and services relative to foreign-produced goods and services. A lower price level makes that economy's goods more attractive to foreign buyers, increasing exports. It will also make foreign-produced goods and services less attractive to the economy's buyers, reducing imports. The result is an increase in net exports. The international trade effect is the tendency for a change in the price level to affect net exports.

Taken together, then, a fall in the price level means that the quantities of consumption, investment, and net export components of aggregate demand may all rise. Since government purchases are determined through a political process, we assume there is no causal link between the price level and the real volume of

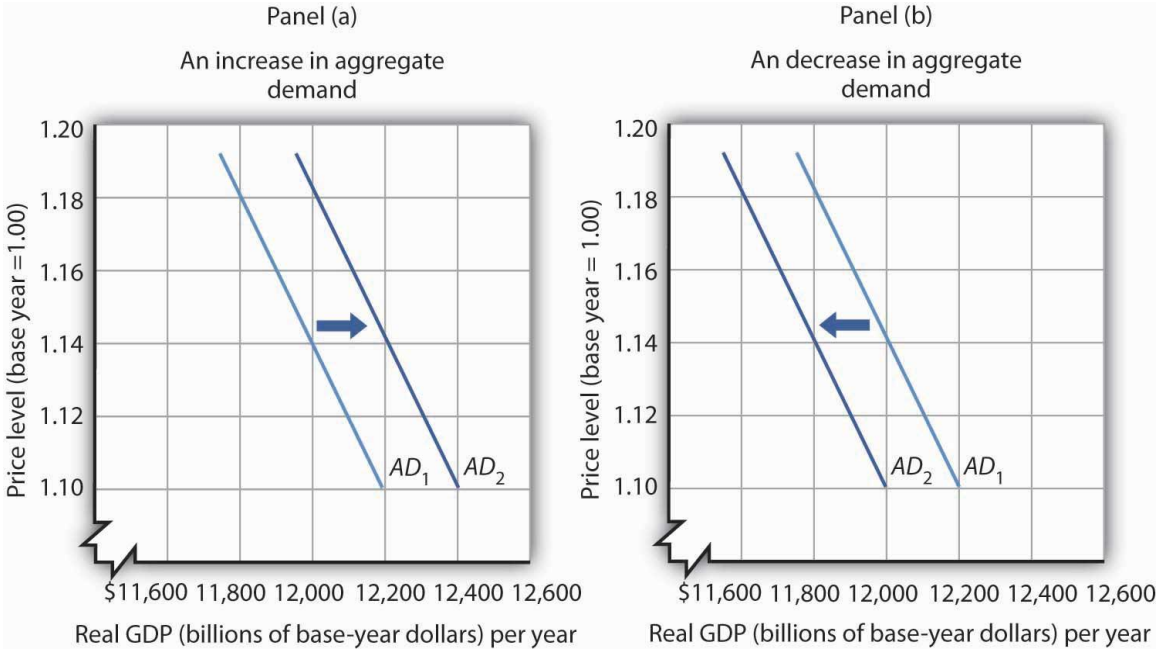
government purchases. Therefore, this component of GDP does not contribute to the downward slope of the curve.

In general, a change in the price level, with all other determinants of aggregate demand unchanged, causes a movement along the *AD* curve. A movement along an *AD* curve is a change in the aggregate quantity of goods and services demanded. A movement from point A to point B on the *AD* curve is an example. Such a change is a response to a change in the price level.

Changes in Aggregate Demand

Aggregate demand changes in response to a change in any of its components. An increase in the total quantity of consumer goods and services demanded at every price level, for example, would shift the *AD* curve to the right. A change in the aggregate quantity of goods and services demanded at every price level is a change in aggregate demand, which shifts the *AD* curve. Increases and decreases in aggregate demand are shown in Figure 2.2 *Changes in Aggregate Demand.*

Figure 2.2 *Changes in Aggregate Demand*



An increase in consumption, investment, government purchases, or net exports shifts the aggregate demand curve AD_1 to the right as shown in Panel (a). A reduction in one of the components of aggregate demand shifts the curve to the left, as shown in Panel (b).

What factors might cause the *AD* curve to shift? Each of the components of aggregate demand is a possible **aggregate demand shifter**. We shall look at some of the events that can trigger changes in the components of aggregate demand and thus shift the *AD* curve.

Aggregate demand shifters

AD shifters include changes in consumption, changes in investment, changes in government purchases, and changes in net exports.

1) Consumption

- Consumer confidence. Several events could change the quantity of consumption at each price level and thus shift aggregate demand. One determinant of consumption is consumer confidence. If consumers expect good economic conditions and are optimistic about their economic prospects, they are more likely to buy major items such as cars or furniture. The result would be an increase in the real value of consumption at each price level and an increase in aggregate demand. In the second half of the 1990s, sustained economic growth and low unemployment fueled high expectations and consumer optimism. Surveys revealed consumer confidence to be very high. That consumer confidence translated into increased consumption and increased aggregate demand. In contrast, a decrease in consumption would accompany diminished consumer expectations and a decrease in consumer confidence, as happened after the stock market crash of 1929. The same problem has plagued the economies of most Western nations in 2008 as declining consumer confidence has tended to reduce consumption.

- Tax policy. Another factor that can change consumption and shift aggregate demand is tax policy. A cut in personal income taxes leaves people with more after-tax income, which may induce them to increase their consumption. For example, the US government cut taxes in 1964, 1981, 1986, 1997, and 2003; each of those tax cuts tended to increase consumption and aggregate demand at each price level.

- Transfer payments. Transfer payments such as welfare and Social Security also affect the income people have available to spend. At any given price level, an

increase in transfer payments raises consumption and aggregate demand, and a reduction lowers consumption and aggregate demand.

2) Investment

- Firms' expectations. Investment is the production of new capital that will be used for future production of goods and services. Firms make investment choices based on what they think they will be producing in the future. The expectations of firms thus play a critical role in determining investment. If firms expect their sales to go up, they are likely to increase their investment so that they can increase production and meet consumer demand. Such an increase in investment raises the aggregate quantity of goods and services demanded at each price level; it increases aggregate demand.

- Interest rates. Changes in interest rates also affect investment and thus affect aggregate demand. We must be careful to distinguish such changes from the interest rate effect, which causes a movement along the *AD* curve. A change in interest rates that results from a change in the price level affects investment in a way that is already captured in the downward slope of the *AD* curve; it causes a movement along the curve. A change in interest rates for some other reason shifts the curve. We examine reasons interest rates might change in another chapter.

- Tax policy. Investment can also be affected by tax policy. For example, a reduction in the tax rate on certain capital gains when the owner of an asset, such as a house or a factory, sells the asset for more than its purchase price. The lower capital gains tax could stimulate investment, because the owners of such assets know that they will lose less to taxes when they sell those assets, thus making assets subject to the tax more attractive.

3) Government Purchases

Any change in government purchases, all other things unchanged, will affect aggregate demand. An increase in government purchases increases aggregate demand; a decrease in government purchases decreases aggregate demand. For example, reductions in defense spending in the wake of the collapse of the Soviet Union in 1991 tended to reduce aggregate demand. Similarly, increased defense

spending for the wars in Afghanistan and Iraq increased aggregate demand. Dramatic increases in defense spending to fight World War II accounted in large part for the rapid recovery from the Great Depression.

4) Net Exports

They are influenced by the following factors:

- Foreign incomes. A change in the value of net exports at each price level shifts the *AD* curve. A major determinant of net exports is foreign demand for a country's goods and services; that demand will vary with foreign incomes. An increase in foreign incomes increases a country's net exports and aggregate demand; a slump in foreign incomes reduces net exports and aggregate demand. For example, several major U.S. trading partners in Asia suffered recessions in 1997 and 1998. Lower real incomes in those countries reduced U.S. exports and tended to reduce aggregate demand.

- Exchange rates. Exchange rates also influence net exports, all other things unchanged. A country's exchange rate is the price of its currency in terms of another currency or currencies. A rise in the U.S. exchange rate means that it takes more Japanese yen, for example, to purchase one dollar. That also means that U.S. traders get more yen per dollar. Since prices of goods produced in Japan are given in yen and prices of goods produced in the United States are given in dollars, a rise in the U.S. exchange rate increases the price to foreigners for goods and services produced in the United States, thus reducing U.S. exports; it reduces the price of foreign-produced goods and services for U.S. consumers, thus increasing imports to the United States. A higher exchange rate tends to reduce net exports, reducing aggregate demand. A lower exchange rate tends to increase net exports, increasing aggregate demand.

- Foreign price levels. Foreign price levels can affect aggregate demand in the same way as exchange rates. For example, when foreign price levels fall relative to the price level in the United States, U.S. goods and services become relatively more expensive, reducing exports and boosting imports in the United States. Such a reduction in net exports reduces aggregate demand. An increase in foreign prices relative to U.S. prices has the opposite effect.

- Various countries' trade policies. The trade policies of various countries can also affect net exports. For example, a policy by Japan to increase its imports of goods and services from India, for example, would increase net exports in India.

The Multiplier

A change in any component of aggregate demand shifts the *AD* curve. Generally, the *AD* curve shifts by more than the amount by which the component initially causing it to shift changes.

Suppose that net exports increase due to an increase in foreign incomes. As foreign demand for domestically made products rises, a country's firms will hire additional workers or perhaps increase the average number of hours that their employees work. In either case, incomes will rise, and higher incomes will lead to an increase in consumption. Taking into account these other increases in the components of aggregate demand, the *AD* curve will shift by more than the initial shift caused by the initial increase in net exports.

The multiplier is the ratio of the change in the quantity of real GDP demanded at each price level to the initial change in one or more components of aggregate demand that produced it.

Multiplier = Δ in real GDP demanded at each price level / initial Δ in any component of *AD*

We use the capital Greek letter delta (Δ) to mean 'change in'. In the aggregate demand–aggregate supply model (AD-AS model) in this chapter, it is the number by which we multiply an initial change in aggregate demand to obtain the amount by which the *AD* curve shifts as a result of the initial change. In other words, we can use the following equation to solve for the change in real GDP demanded at each price level:

Δ in real GDP demanded at each price level = multiplier × initial Δ in any component of *AD*

Example using cause and effect chains: An increase in foreign incomes → Xn of our country increases. D for Pdom increases → Firms increase L. As a result, incomes increase → C increases. AD curve shifts → → → because of initial shift of Xn.

Key concepts

1. **Aggregate demand** is the relationship between the total quantity of goods and services demanded (from all the four sources of demand) and the price level, all other determinants of spending unchanged.
2. The ***AD* curve** represents the total of consumption, investment, government purchases, and net exports at each price level in any period. It slopes downward because of the wealth effect on consumption, the interest rate effect on investment, and the international trade effect on net exports.
3. The *AD* curve shifts when the quantity of real GDP demanded at each price level changes. **AD shifters** include changes in consumption, changes in investment, changes in government purchases, and changes in net exports.
4. The **multiplier** is the number by which we multiply an initial change in AD to obtain the amount by which the *AD* curve shifts at each price level as a result of the initial change.

UNIT 2.2 AD-AS model. The Long Run and the Short Run

Learning objective

- Draw a hypothetical long-run aggregate supply curve and explain what it shows about the natural levels of employment and output at various price levels, given changes in aggregate demand.
- Draw a hypothetical short-run aggregate supply curve, explain why it slopes upward, and explain why it may shift; that is, distinguish between a change in the aggregate quantity of goods and services supplied and a change in short-run aggregate supply.
- Discuss various explanations for wage and price stickiness.
- Explain and illustrate what is meant by equilibrium in the short run and relate the equilibrium to potential output.

In macroeconomics, we seek to understand two types of equilibria, one corresponding to the short run and the other corresponding to the long run. The **short run** in the macroeconomic analysis is a period in which wages and some

other prices do not respond to changes in economic conditions. In certain markets, as economic conditions change, prices (including wages) may not adjust quickly enough to maintain equilibrium in these markets. A **sticky price** is a price that is slow to adjust to its equilibrium level, creating sustained periods of shortage or surplus. Wage and price stickiness prevent the economy from achieving its natural level of employment, known also as full employment and its potential output. **Potential output** is the level of output an economy can achieve when labor is employed at its natural level.

In contrast, the **long run** in the macroeconomic analysis is a period in which wages and prices are flexible. In the long run, employment will move to its natural level and real GDP to potential.

We begin with a discussion of long-run macroeconomic equilibrium, because this type of equilibrium allows us to see the macroeconomy after full market adjustment has been achieved. In contrast, in the short run, price or wage stickiness is an obstacle to full adjustment. Why these deviations from the potential level of output occur and what the implications are for the macroeconomy will be discussed in the section on short-run macroeconomic equilibrium.

The Long Run and the potential level of output

Full employment, or, as economists call it, the natural level of employment occurs where the real wage adjusts so that the quantity of labor demanded equals the quantity of labor supplied. When the economy achieves its natural level of employment, it achieves its potential level of output. We will see that real GDP eventually moves to potential, because all wages and prices are assumed to be flexible in the long run.

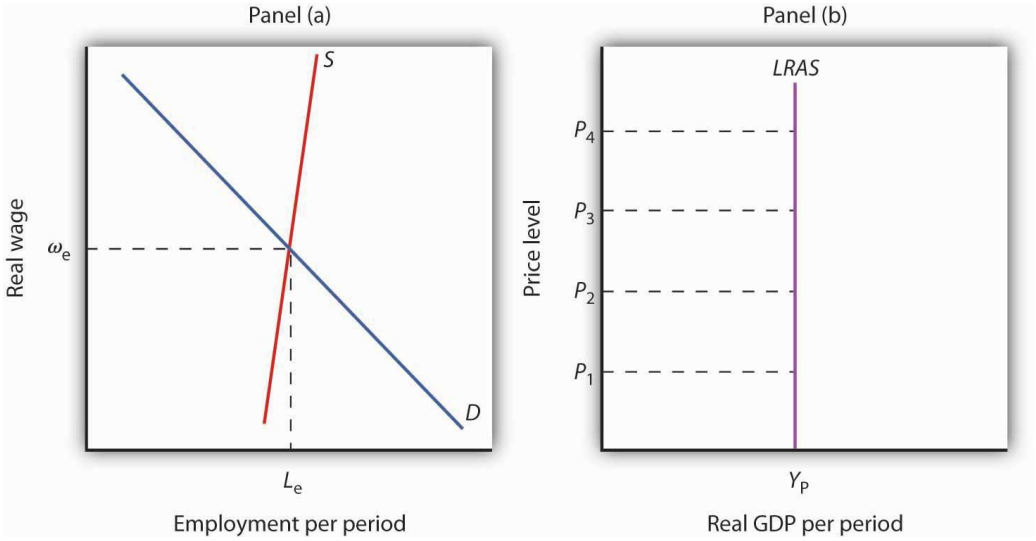
Long-Run Aggregate Supply

The long-run aggregate supply (LRAS) curve relates the level of output produced by firms to the price level in the long run. In Panel (b) of Figure 2.3 *Natural Employment and Long-Run Aggregate Supply*, the LRAS curve is a vertical line at the economy's potential level of output. There is a single real wage at which employment reaches its natural level. In Panel (a) only a real wage of ω_e generates

natural employment ***Le***. The economy could, however, achieve this real wage with any combination of nominal wage and price level. For example, the equilibrium real wage ω_e (the ratio of wages to the price level) is 1.5. We could have that with a nominal wage level of 1.5 and a price level of 1.0, a nominal wage level of 1.65 and a price level of 1.1, a nominal wage level of 3.0 and a price level of 2.0, and so on.

When the economy achieves its natural level of employment, as shown in Panel (a) at the intersection of the demand and supply curves for labor, it achieves its potential output, as shown in Panel (b) by the vertical long-run aggregate supply curve *LRAS* at Y_P. In Panel (b) we see price levels ranging from P_1 to P_4. Higher price levels would require higher nominal wages to create a real wage of ω_e, and flexible nominal wages would achieve that in the long run.

Figure 2.3 *Natural Employment and Long-Run Aggregate Supply*



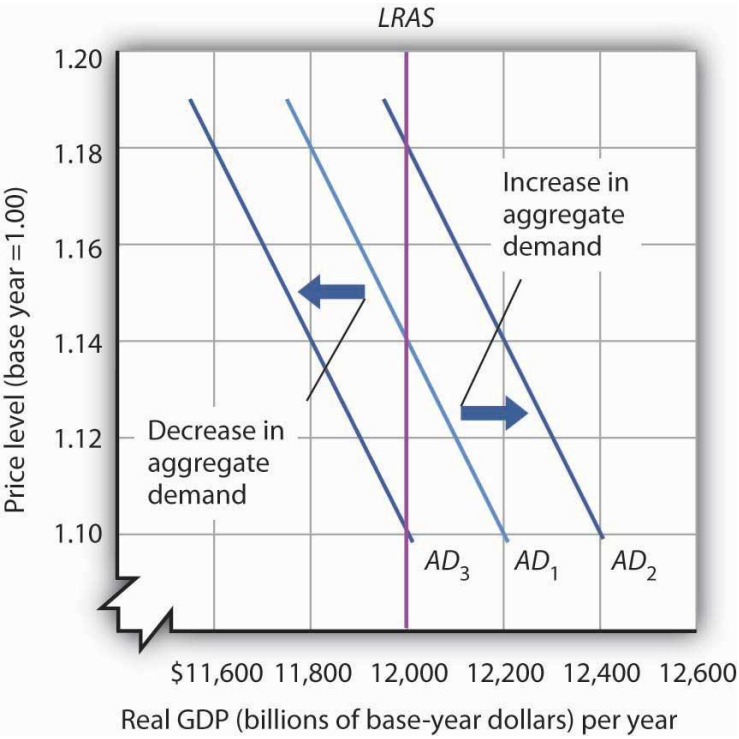
In the long run, then, the economy can achieve its natural level of employment and potential output at any price level. This conclusion gives us our *LRAS* curve. With only one level of output at any price level, the *LRAS* curve is a vertical line at the economy's potential level of output of Y_P.

Equilibrium Levels of Price and Output in the Long Run

The intersection of the economy's *AD* curve and the *LRAS* curve determines its equilibrium real GDP and price level in the long run. Figure 2.4 *Long-Run Equilibrium* depicts an economy in long-run equilibrium.

With aggregate demand at AD_1 and the *LRAS* curve as shown, real GDP is \$12,000 billion per year and the price level is 1.14. If aggregate demand increases to AD_2, long-run equilibrium will be reestablished at real GDP of \$12,000 billion per year, but at a higher price level of 1.18. If aggregate demand decreases to AD_3, long-run equilibrium will still be at real GDP of \$12,000 billion per year, but with the now lower price level of 1.10.

Figure 2.4 *Long-Run Equilibrium*

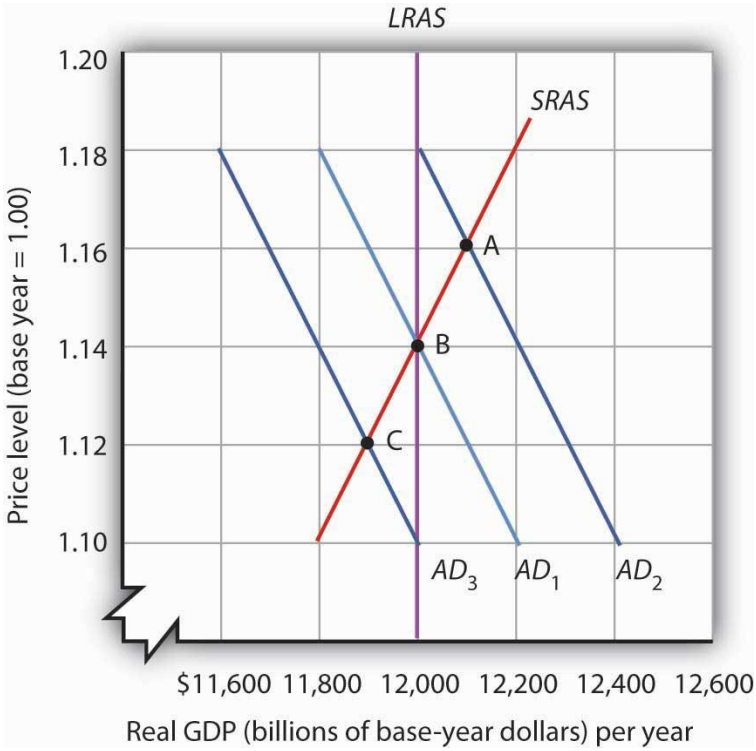


To sum up, long-run equilibrium occurs at the intersection of the *AD* curve and the *LRAS* curve. For the three *AD* curves shown, long-run equilibrium occurs at three different price levels, but always at an output level of \$12,000 billion per year, which corresponds to potential output.

The Short Run

Analysis of the macroeconomy in the short run – a period in which stickiness of wages and prices may prevent the economy from operating at potential output – helps explain how deviations of real GDP from potential output can and do occur. We will explore the effects of changes in aggregate demand and in short-run aggregate supply in this section.

Figure 2.5 *Deriving the SRAS Curve*



The economy shown in Figure 2.5 *Deriving the SRAS Curve* is in long-run equilibrium at the intersection of $AD_1$with the *SRAS* curve at point B. If aggregate demand increases to AD_2, in the short run, both real GDP and the price level rise. If aggregate demand decreases to AD_3, in the short run, both real GDP and the price level fall. A line drawn through points A, B, and C traces out the *SRAS* curve.

The model of *AD* and *LRAS* predicts that the economy will eventually move toward its potential output. To see how nominal wage and price stickiness can cause real GDP to be either above or below potential in the short run, consider the response of the economy to a change in *AD*. Figure 2.5 *Deriving the SRAS Curve* shows an economy that has been operating at potential output of $12,000 billion and a price level of 1.14. This occurs at the intersection of AD_1 with the *SRAS* curve at point B. Now suppose that the *AD* curve shifts to the right (to AD_2). This could occur as a result of an increase in exports. (The shift from AD_1 to AD_2 includes the multiplied effect of the increase in exports.) At the price level of 1.14, there is now excess demand and pressure on prices to rise. If all prices in the economy adjusted quickly, the economy would quickly settle at potential output of $12,000 billion, but at a higher price level (1.18 in this case).

Is it possible to expand output above potential?

Yes. It may be the case, for example, that some people who were in the labor force but were frictionally or structurally unemployed find work because of the ease of getting jobs at the going nominal wage in such an environment. The result is an economy operating at point A in Figure *Deriving the SRAS Curve* at a higher price level and with output temporarily above potential.

Consider next the effect of a reduction in aggregate demand (to AD_3), possibly due to a reduction in investment. As the price level starts to fall, output also falls. The economy finds itself at a price level–output combination at which real GDP is below potential, at point C. Again, price stickiness is to blame. The prices firms receive are falling with the reduction in demand. Without corresponding reductions in nominal wages, there will be an increase in the real wage. Firms will employ less labor and produce less output.

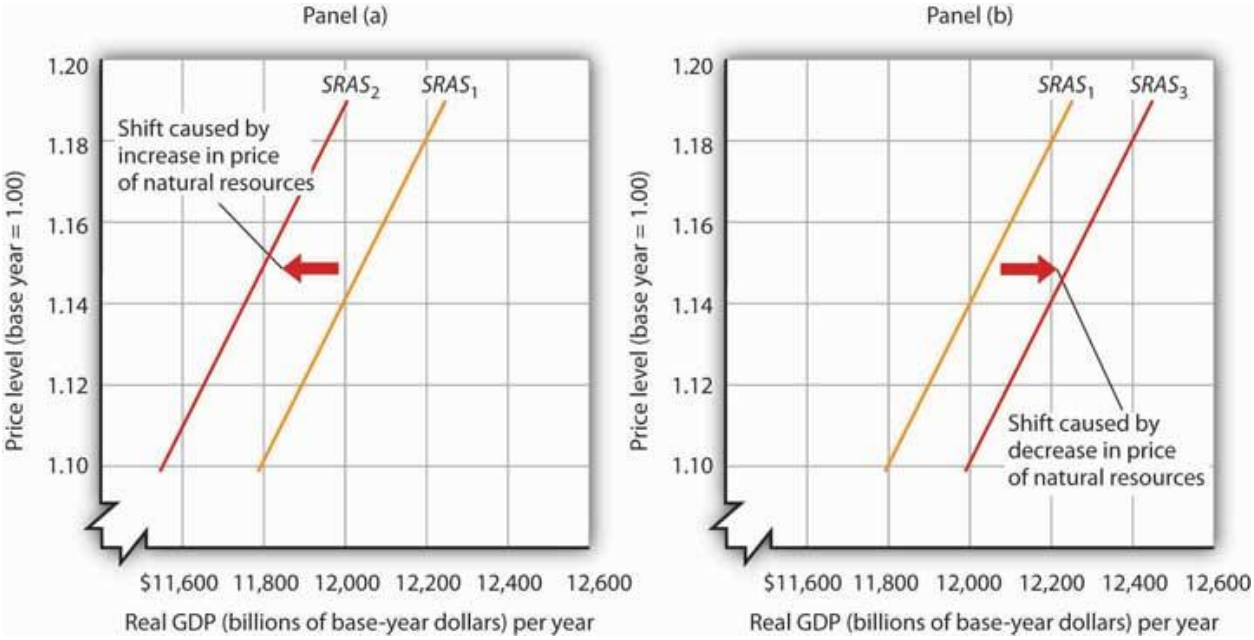
By examining what happens as aggregate demand shifts over a period when price adjustment is incomplete, we can trace out the *SRAS* curve by drawing a line through points A, B, and C. The SRAS curve is a graphical representation of the relationship between production and the price level in the short run. Among the factors held constant in drawing a *SRAS* curve are the capital stock, the stock of natural resources, the level of technology, and the prices of factors of production.

A change in the price level produces a change in the aggregate quantity of goods and services supplied and is illustrated by the movement along the *SRAS* curve. This occurs between points A, B, and C.

A change in the quantity of goods and services supplied at every price level in the short run is a change in *SRAS*. Changes in the factors held constant in drawing the *SRAS* curve shift the curve. (These factors may also shift the long-run *AS* supply curve.)

One type of event that would shift the *SRAS* curve is an increase in the price of a natural resource such as oil. An increase in the price of natural resources or any other factor of production, all other things unchanged, raises the cost of production and leads to a reduction in *SRAS*.

Figure 2.6 *Changes in SRAS*



In Panel (a) of Figure 2.6 *Changes in SRAS*, $SRAS_1$ shifts leftward to $SRAS_2$. A decrease in the price of a natural resource would lower the cost of production and, other things unchanged, would allow greater production from the economy's stock of resources and would shift the *SRAS* curve to the right; such a shift is shown in Panel (b) by a shift from $SRAS_1$ to $SRAS_3$.

Reasons for Wage and Price Stickiness

Wage or price stickiness means that the economy may not always be operating at potential. Rather, the economy may operate either above or below potential output in the short run. Correspondingly, the overall unemployment rate will be below or above the natural level.

Many prices observed throughout the economy do adjust quickly to changes in market conditions so that equilibrium, once lost, is quickly regained. Prices for fresh food and shares of common stock are two such examples. Other prices, though, adjust more slowly. Nominal wages, the price of labor, adjust very slowly.

Wage Stickiness

Wage contracts fix nominal wages for the life of the contract. The length of wage contracts varies from one week or one month for temporary employees, to one year (teachers and professors often have such contracts), to three years (for most union workers).

One reason workers and firms may be willing to accept long-term nominal wage contracts is that negotiating a contract is a costly process. Both parties must keep themselves adequately informed about market conditions. Some contracts do attempt to take into account changing economic conditions, such as inflation, through cost-of-living adjustments, but even these relatively simple measures are not as widespread as one might think. Finally, minimum wage laws prevent wages from falling below a legal minimum, even if unemployment is rising. Unskilled workers are particularly vulnerable to shifts in aggregate demand.

Price Stickiness

Since wages are a major component of the overall cost of doing business, wage stickiness may lead to output price stickiness. With nominal wages stable, at least some firms can adopt a 'wait and see' attitude before adjusting their prices. During this time, they can evaluate information about why sales are rising or falling and try to assess likely reactions by consumers or competing firms in the industry to any price changes they might make.

In the meantime, firms may prefer to adjust output and employment in response to changing market conditions, leaving product price alone. Quantity adjustments have costs, but firms may assume that the associated risks are smaller than those associated with price adjustments.

Another possible explanation for price stickiness is the notion that there are adjustment costs associated with changing prices. They are sometimes called 'menu costs', using the example of restaurateurs who cannot afford to print menus with new prices every day according to small fluctuations in demand. In some cases, firms must print new price lists and catalogs, and notify customers of price changes. But doing this too often could jeopardize customer relations.

Yet another explanation of price stickiness is that firms may have explicit long-term contracts to sell their products to other firms at specified prices. For example, electric utilities often buy their inputs of coal or oil under long-term contracts.

Taken together, these reasons for wage and price stickiness explain why aggregate price adjustment may be incomplete in the sense that the change in the

price level is insufficient to maintain real GDP at its potential level. These reasons do not lead to the conclusion that no price adjustments occur. But the adjustments require some time. During this time, the economy may remain above or below its potential level of output.

Key concepts

- The **short run** in macroeconomics is a period in which wages and some other prices are sticky. The **long run** is a period in which full wage and price flexibility, and market adjustment, has been achieved, so that the economy is at the natural level of employment and potential output.
- **Potential output** is the level of output an economy can achieve when there is full employment in the country.
- The ***LRAS* curve** is a vertical line at the potential level of output. The intersection of the economy's *AD* and *LRAS* curves determines its **equilibrium real GDP and price level** in the long run.
- The ***SRAS* curve** is an upward-sloping curve that shows the quantity of total output that will be produced at each price level in the short run. Wage and price stickiness account for the *SRAS* curve's upward slope.
- **AS shifters**. Changes in prices of factors of production shift the *SRAS* curve. In addition, changes in the capital stock, the stock of natural resources, and the level of technology can also cause the *SRAS* curve to shift.

UNIT 2.3 Recessionary and Inflationary Gaps

Learning objectives

1. Explain and illustrate graphically recessionary and inflationary gaps.
2. Relate these gaps to what is happening in the labor market.

In the short run, the equilibrium price level and the equilibrium level of total output are determined by the intersection of the *AD* and the *SRAS* curves. In the short run, output can be either below or above potential output.

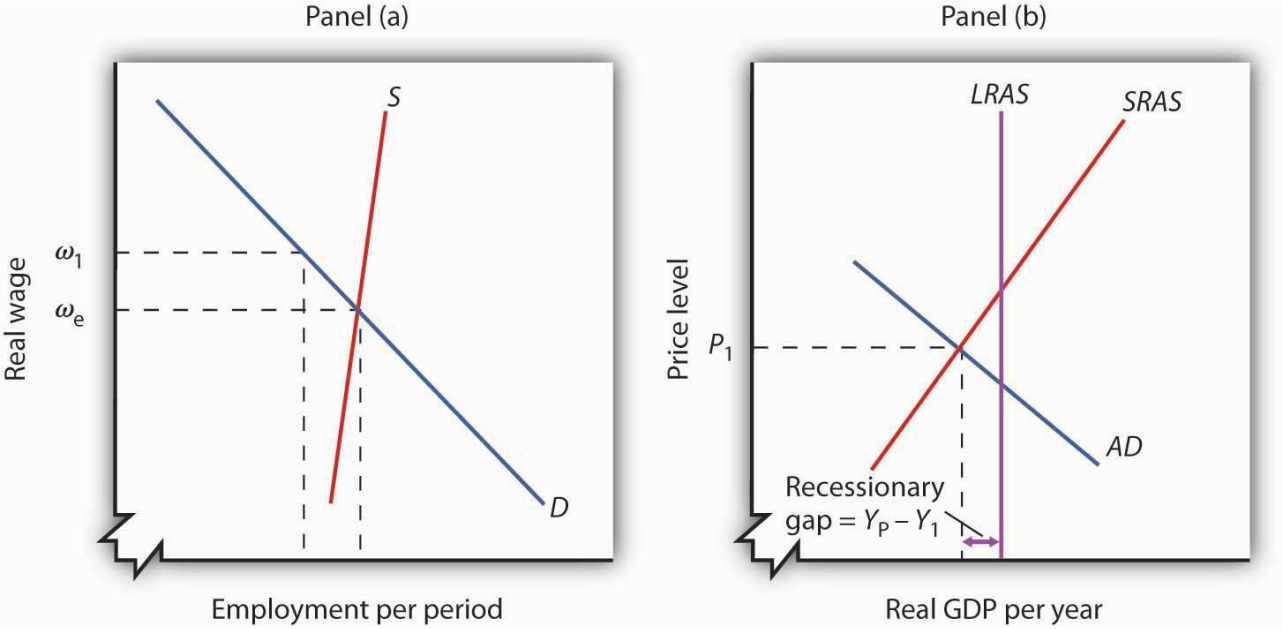
In the short run, actual output may exceed or fall short of potential output. In such a situation the economy operates with a gap. The gap arises because stickiness

of nominal wages and other prices can prevent the economy from achieving its potential output. When output is above potential, employment is above the natural level of employment. When output is below potential, employment is below the natural level.

A recessionary gap

At any time, real GDP and the price level are determined by the intersection of the *AD* and *SRAS* curves. If employment is below the natural level of employment, real GDP will be below potential. The aggregate demand and short-run aggregate supply curves will intersect to the left of the long-run aggregate supply curve.

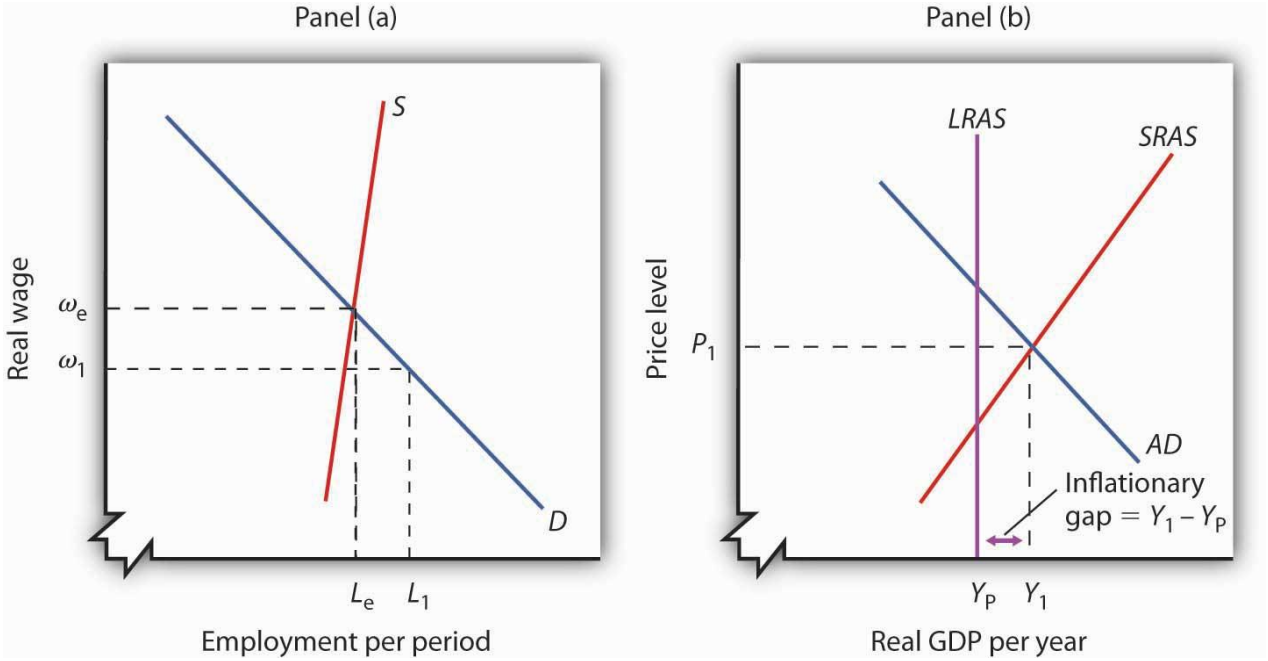
Figure 2.7 *A Recessionary Gap*



Suppose an economy's natural level of employment is *L*e, shown in Panel (a) of Figure 2.7 *A Recessionary Gap*. This level of employment is achieved at a real wage of ω_e. Suppose, however, that the initial real wage ω_1 exceeds this equilibrium value. Employment at L_1 falls short of the natural level. A lower level of employment produces a lower level of output; the *AD* and *SRAS* curves intersect to the left of the *LRAS* curve in Panel (b). The gap between the level of real GDP and potential output, when real GDP is less than potential, is called a recessionary gap. Panel (b) shows the recessionary gap $Y_P - Y_1$, which occurs when the *AD* curve and the *SRAS* curve intersect to the left of the *LRAS* curve.

An Inflationary Gap

Figure 2.8 *An Inflationary Gap*



Just as employment can fall short of its natural level, it can also exceed it. If employment is greater than its natural level, real GDP will also be greater than its potential level. Figure 2.8 *An Inflationary Gap* shows an economy with a natural level of employment of $\boldsymbol{L}_e$ in Panel (a) and potential output of $\boldsymbol{Y}_P$ in Panel (b). If the real wage $\boldsymbol{\omega}_1$ is less than the equilibrium real wage $\boldsymbol{\omega}_e$, then employment $\boldsymbol{L}_1$ will exceed the natural level. As a result, real GDP, $\boldsymbol{Y}_1$, exceeds potential. The gap between the level of real GDP and potential output, when real GDP is greater than potential, is called an **inflationary gap**. In Panel (b), the inflationary gap equals $Y_1 - Y_P$. The AD curve and the SRAS curve intersect to the right of the LRAS curve.

UNIT 2.4 Restoring Long-Run Macroeconomic Equilibrium

We have already seen that the *AD* curve shifts in response to a change in consumption, investment, government purchases, or net exports. The *SRAS* curve shifts in response to changes in the prices of factors of production, the quantities of factors of production available, or technology.

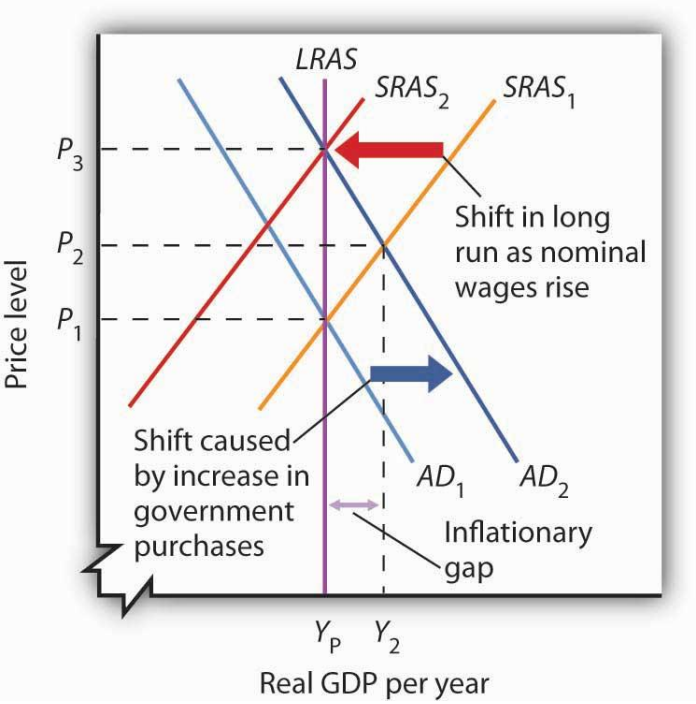
Now we will see how the economy responds to a shift in *AD* or *SRAS* using two examples: a change in government purchases and a change in production costs.

A Shift in Aggregate Demand

Suppose an economy is initially in equilibrium at potential output Y_P as in Figure 2.9 *Long-Run Adjustment to an Inflationary Gap*. Because the economy is operating at its potential, the labor market must be in equilibrium; the quantities of labor demanded and supplied are equal.

An increase in aggregate demand to AD_2 boosts real GDP to Y_2 and the price level to P_2, creating an inflationary gap of $Y_2 - Y_P$. In the long run, as price and nominal wages increase, the *SRAS* curve moves to $SRAS_2$. Real GDP returns to potential.

Figure 2.9 *Long-Run Adjustment to an Inflationary Gap*



Now suppose aggregate demand increases because one or more of its components (consumption, investment, government purchases, and net exports) has increased at each price level. For example, suppose government purchases increase. The *AD* curve shifts from AD_1 to AD_2 in Figure 2.9 *Long-Run Adjustment to an Inflationary Gap*. That will increase real GDP to Y_2 and force the price level up to P_2 in the short run. The higher price level, combined with a fixed nominal wage,

results in a lower real wage. Firms employ more workers to supply the increased output.

The economy's new production level Y_2 exceeds potential output. Employment exceeds its natural level. The economy with output of Y_2 and price level of P_2 is only in short-run equilibrium; there is an inflationary gap equal to the difference betweenY_2 and Y_P. Because real GDP is above potential, there will be pressure on prices to rise further.

Ultimately, the nominal wage will rise as workers seek to restore their lost purchasing power. As the nominal wage rises, the *SRAS* curve will begin shifting to the left. It will continue to shift as long as the nominal wage rises, and the nominal wage will rise as long as there is an inflationary gap. These shifts in *SRAS*, however, will reduce real GDP and thus begin to close this gap. When the *SRAS* curve reaches $SRAS_2$, the economy will have returned to its potential output, and employment will have returned to its natural level. These adjustments will close the inflationary gap.

A Shift in Short-Run Aggregate Supply

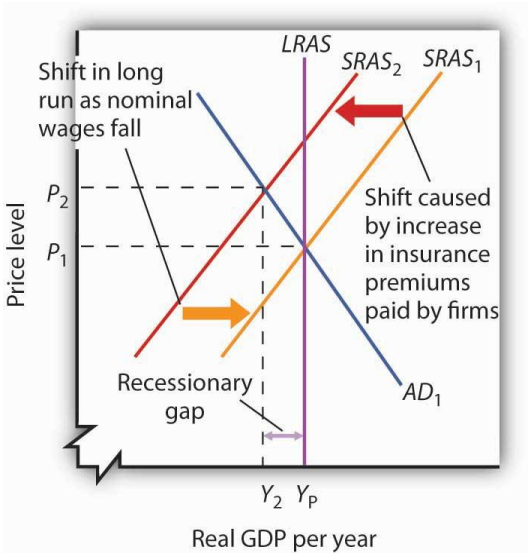
Again suppose, with an aggregate demand curve at AD_1 and a short-run aggregate supply at $SRAS_1$, an economy is initially in equilibrium at its potential output Y_P, at a price level of P_1, as shown in Figure 2.10 *Long-Run Adjustment to a Recessionary Gap*. Now suppose that the *SRAS* curve shifts owing to a rise in the cost of health care. Because health insurance premiums are paid primarily by firms for their workers, an increase in premiums raises the cost of production and causes a reduction in the *SRAS* curve from $SRAS_1$ to $SRAS_2$.

As a result, the price level rises to P_2 and real GDP falls to Y_2. The economy now has a recessionary gap equal to the difference between Y_P and Y_2. Notice that this situation is particularly disagreeable, because both unemployment and the price level rose.

With real GDP below potential, though, there will eventually be pressure on the price level to fall. Increased unemployment also puts pressure on nominal wages to fall. In the long run, the *SRAS* curve shifts back to $SRAS_1$. In this case, real GDP

returns to potential at Y_P, the price level falls back to P_1, and employment returns to its natural level. These adjustments will close the recessionary gap.

Figure 2.10 *Long-Run Adjustment to a Recessionary Gap*



To sum up, a decrease in aggregate supply from $SRAS_1$ to $SRAS_2$ reduces real GDP to Y_2 and raises the price level to P_2, creating a recessionary gap of $Y_P - Y_2$. In the long run, as prices and nominal wages decrease, the *SRAS* curve moves back to $SRAS_1$ and real GDP returns to potential.

Chapter 2. A Multiple Choice Test

1. The aggregate demand curve expresses the relationship between:
   a) price level and total cost of goods and services
   b) price level and GDP in real terms
   c) the price level that buyers recognize and the price level that satisfies sellers
   d) the volume of GDP produced and consumed in real term.
2. The Keynesian part on the aggregate supply curve:
   a) has a positive slope
   b) has a negative slope
   c) is represented by a vertical line
   d) is represented by a horizontal line.
3. Explain the effect of each of the following on the AD curve for Country A:
   1. A decrease in consumer optimism

2. An increase in real GDP in the countries that buy Country A exports
3. An increase in the price level
4. An increase in government spending on highways

4. Inflationary or recessionary gaps: Using the scenario of the Great Depression of the 1930s, explain what kind of gap the U.S. economy faced in 1933, assuming the economy had been at potential output in 1929. Answer the questions and explain:

1) Do you think the unemployment rate was above or below the natural rate of unemployment?

2) How could the economy have been brought back to its potential output?

5. All other things unchanged, compare the position of a country's expected production possibility curve and the expected position of its LRAS curve if:

1.Its labor force increases in size by 3% per year compared to 2% per year.
2.Its saving rate falls from 15% to 10%.
3.It passes a law making it more difficult to fire workers.
4.Its level of education rises more quickly than it has in the past.

6. If a reduction in aggregate supply is followed by an increase in aggregate demand, which of the following will definitely occur?

a) Output will increase.
b) Output will decrease.
c) Output will not change.
d) The price level will increase.
e) The price level will decrease.

7. With an increase in the real interest rate, consumption and real GDP will most likely change in which of the following ways?

	Consumption	Real Gross Domestic Product
(A)	Increase	Increase
(B)	Increase	Decrease
(C)	Decrease	Increase
(D)	Decrease	Decrease
(E)	No change	Increase

8. An increase in which of the following would cause the aggregate demand curve to shift to the left?

a) Consumer optimism

b) Population

c) Cost of resources

d) Income taxes

e) Net exports

9. With an upward-sloping SRAS curve, an increase in government expenditure will most likely

a) reduce the price level

b) reduce the level of nominal gross domestic product

c) increase real gross domestic product

d) shift the short-run aggregate supply curve to the right

e) shift both the aggregate demand curve and the long-run aggregate supply curve to the left

10. The shifting of a country's production possibilities curve to the right will most likely cause

a) net exports to decline

b) inflation to increase

c) the aggregate demand curve to shift to the left

d) the long-run aggregate supply curve to shift to the left

e) the long-run aggregate supply curve to shift to the right

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **AD-AS Model:** Suppose the aggregate demand (AD) and short-run aggregate supply (SRAS) schedules for an economy whose potential output equals $2,700 are given by the table below.

	Aggregate Quantity of Goods and Services	
Price Level	**Demanded**	**Supplied**

	Aggregate Quantity of Goods and Services	
0.50	$3,500	$1,000
0.75	3,000	2,000
1.00	2,500	2,500
1.25	2,000	2,700
1.50	1,500	2,800

1) Draw the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves.
2) State the short-run equilibrium level of real GDP and the price level.
3) Characterize the current economic situation. Is there an inflationary or a recessionary gap? If so, how large is it?
4) Now suppose aggregate demand increases by $700 at each price level; for example, the aggregate quantity of goods and services demanded at a price level of 0.50 now equals $4,200. Show the new aggregate demand curve, state the new short-run equilibrium price level and real GDP, and state whether there is an inflationary or a recessionary gap and give its size.

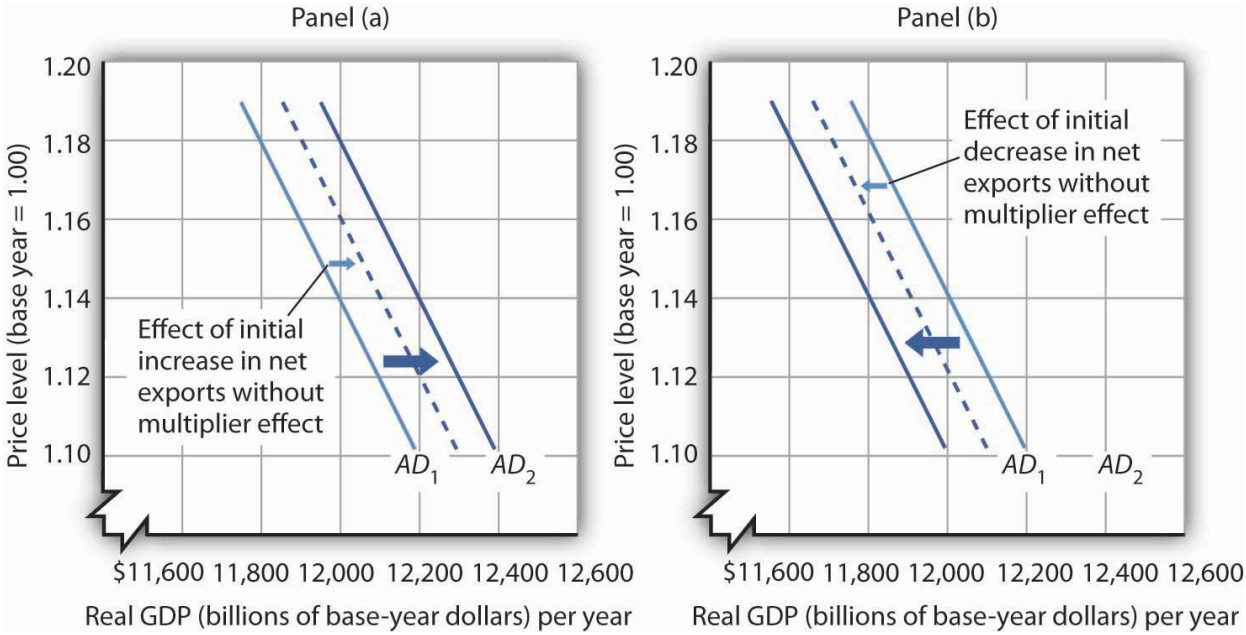
2. **The Multiplier effect:** Suppose that the initial increase in net exports is $100 billion and that the initial $100-billion increase generates additional consumption of $100 billion at each price level. Study Panel (a) of Figure 2.11 *The Multiplier effect*, and write down the answers to the following questions:

1) Write an equation to compute the multiplier. What does the multiplier equal in this example?

2) What is the real GDP after the *AD* curve shifts to the right as shown in Panel (a) due to an increase in net exports at the price level of 1.18?

3) What is the real GDP after the *AD* curve shifts to the left as shown in Panel (b) due to a decrease in net exports at the price level of 1.14?

Figure 2.11 ***The Multiplier effect***



3.**AD curve shifts:** Draw an AD curve for Country A on a graph which shows the real GDP at different price levels (price deflator is more than 1.00). Show the AD curve shifts as a result of the following events. Using the cause-and-effect chains (arrows demonstrating changes in different components of AD), explain the effect of each of the following events on consumer willingness to buy more or less of goods and services.

Use the example of the cause-and-effect chain provided for event 1:

Event 1: A decline in consumer optimism. *The answer: ↘ in consumer optimism → AD curve ←; consumers ↘ purchases.*

Event 2: An increase in real GDP in the countries that buy Country A's exports;

Event 3: An increase in the price level;

Event 4: An increase in government spending on highways.

CHAPTER 3. CONSUMPTION AND THE AGGREGATE EXPENDITURES MODEL

UNIT 3.1 Consumption function and saving function

Learning objectives

1. Explain and graph the consumption function and the saving function; explain what the slopes of these curves represent; explain how the two are related to each other.

Consumption and Disposable Personal Income

It seems reasonable to expect that consumption spending by households will be closely related to their DPI, which equals the income households receive less the taxes they pay. Note that DPI and GDP are not the same thing. GDP is a measure of total income; DPI is the income households have available to spend during a specified period.

The relationship between consumption and DPI is called the **consumption function**. It can be represented algebraically as an equation, as a schedule in a table, or as a curve on a graph.

Figure 3.1 *Plotting a Consumption Function* illustrates the consumption function. The relationship between consumption and DPI is evident in the table and in the curve: consumption in any period increases as DPI increases in that period. The slope of the consumption function tells us by how much. Consider points C and D. When DPI (*Y*d) rises by $500 billion, consumption rises by $400 billion. More generally, the slope equals the change in consumption divided by the change in DPI. The ratio of the change in consumption (ΔC) to the change in DPI (Δ*Y*d) is the **marginal propensity to consume** (*MPC*). The Greek letter delta (Δ) is used to denote ‘change in’.

$$MPC = \Delta C / \Delta Yd$$

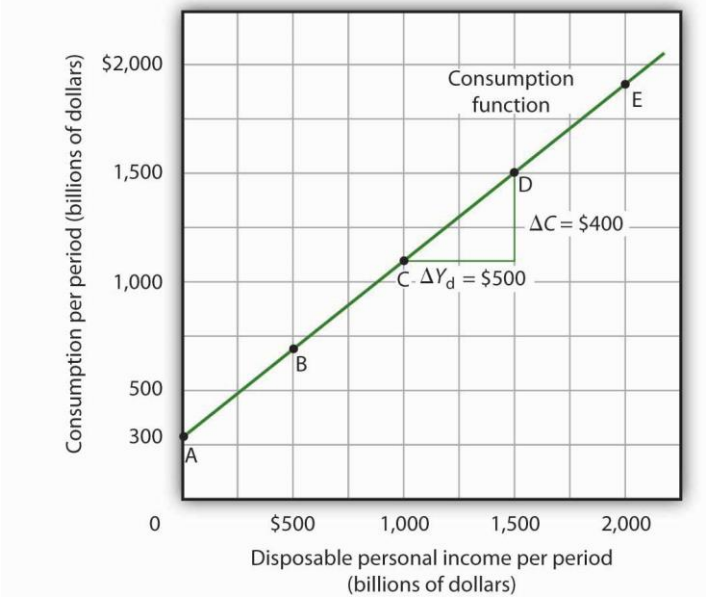
In this case, the MPC equals $400 / $500 = 0.8. It can be interpreted as the fraction of an extra $1 of DPI that people spend on consumption. Thus, if a person with an *MPC* of 0.8 received an extra $1,000 of DPI, that person’s consumption would rise by $0.80 for each extra $1 of DPI, or $800.

We can also express the consumption function as an equation:

$$C = \$300 \text{ billion} + 0.8Yd$$

Figure 3.1 *Plotting a Consumption Function*

Point on curve	A	B	C	D	E
Y_d (billions)	$ 0	500	1,000	1,500	2,000
C (billions)	$300	700	1,100	1,500	1,900



We can use the consumption function to show the relationship between personal saving and DPI. Personal saving is DPI not spent on consumption during a particular period; the value of personal saving for any period is found by subtracting consumption from DPI for that period:

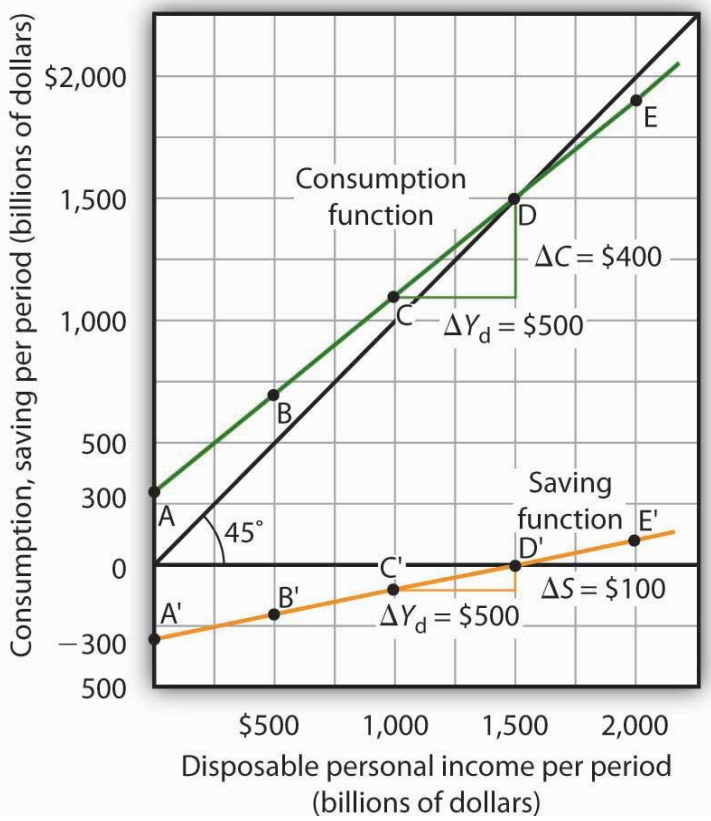
Personal saving = DPI (−) consumption

The saving function relates personal saving in any period to DPI in that period. Figure 3.2 *Consumption and Personal Saving* shows how the consumption function and the saving function are related. Personal saving is calculated by subtracting values for consumption from values for DPI, as shown in the table. The values for personal saving are then plotted in the graph. Notice that a 45-degree line has been added to the graph. At every point on the 45-degree line, the value on the vertical axis equals that on the horizontal axis. The consumption function intersects the 45-degree line at an income of $1,500 billion (point D). At this point, consumption equals DPI and personal saving equals 0 (point D′ on the graph of personal saving). Using the graph to find personal saving at other levels of DPI, we subtract the value of

consumption, given by the consumption function, from DPI, given by the 45-degree line.

Figure 3.2 *Consumption and Personal Saving*

Point on curve	A	B	C	D	E
Y_d (billions)	$ 0	500	1,000	1,500	2,000
C (billions)	$300	700	1,100	1,500	1,900
S (billions)	−$300	−200	−100	0	100



At a DPI of $2,000 billion, for example, consumption is $1,900 billion (point E). Personal saving equals $100 billion (point E′) – the vertical distance between the 45-degree line and the consumption function. At an income of $500 billion, consumption totals $700 billion (point B). The consumption function lies above the 45-degree line at this point; personal saving is −$200 billion (point B′). A negative value for saving means that consumption exceeds DPI; it must have come from saving accumulated in the past, from selling assets, or from borrowing.

Notice that for every $500 billion increase in DPI, personal saving rises by $100 billion. Consider points C′ and D′. When DPI rises by $500 billion, personal saving rises by $100 billion. More generally, the slope of the saving function equals the change in personal saving divided by the change in DPI.

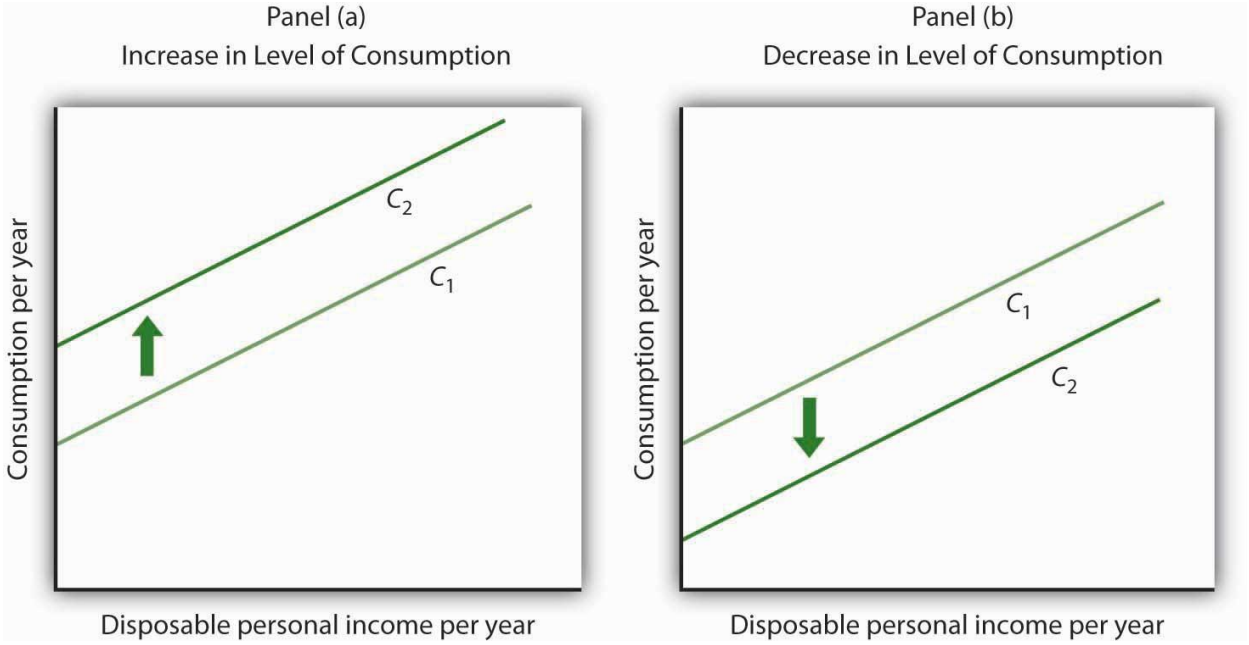
The ratio of the change in personal saving (**Δ*S***) to the change in DPI (**Δ*Y*d**) is the **marginal propensity to save** (*MPS*): ***MPS* = Δ*S* / Δ*Y*d**

In this case, the MPS equals \$100 / \$500 = 0.2. It can be interpreted as the fraction of an extra \$1 of DPI that people save. Thus, if a person with an *MPS* of 0.2 received an extra \$1,000 of DPI, that person's saving would rise by \$0.20 for each extra \$1 of DPI, or \$200. Since people have only two choices of what to do with additional DPI – that is, they can use it either for consumption or for personal saving – the fraction of DPI that people consume (*MPC*) plus the fraction of DPI that people save (*MPS*) must add to 1: ***MPC*+*MPS* = 1**

Other Determinants of Consumption – the so called Shifters

Changes in DPI cause movements *along* this curve; they do not shift the curve. The curve shifts when other determinants of consumption change. Examples of shifters are changes in real wealth and changes in expectations. Figure 3.3 *Shifts in the Consumption Function* illustrates how these changes can cause shifts in the curve.

Figure 3.3 *Shifts in the Consumption Function*



Changes in Real Wealth

An increase in stock and bond prices, for example, would make holders of these assets wealthier, and they would be likely to increase their consumption. An increase in real wealth shifts the consumption function upward, as illustrated in Panel

(a) of Figure 3.3 *Shifts in the Consumption Function*. A reduction in real wealth shifts it downward, as shown in Panel (b).

Changes in Expectations

Consumers are likely to be more willing to spend money when they are optimistic about the future. An increase in consumer optimism tends to shift the consumption function upward as in Panel (a); an increase in pessimism tends to shift it downward as in Panel (b). The sharp reduction in consumer confidence in 2008 and early in 2009 contributed to a downward shift in the consumption function and thus to the severity of the recession.

UNIT 3.2 A Simplified Aggregate Expenditures Model

Learning objectives

1. Explain and illustrate the aggregate expenditures model and the concept of equilibrium real GDP.
2. Distinguish between autonomous and induced aggregate expenditures and explain why a change in autonomous expenditures leads to a multiplied change in equilibrium real GDP.

The consumption function relates the level of consumption in a period to the level of DPI in that period. In this section, we incorporate other components of aggregate demand: investment, government purchases, and net exports. In doing so, we shall develop a new model of the determination of equilibrium real GDP, the aggregate expenditures (***AE***) model. This model relates AE, which equal the sum of planned levels of consumption, investment, government purchases, and net exports at a given price level, to the level of real GDP. We shall see that people, firms, and government agencies may not always spend what they had planned to spend. If so, then actual real GDP will not be the same as AE, and the economy will not be at the equilibrium level of real GDP.

The *AE* Model: A Simplified View

To develop a simple model, we assume that there are only two components of AE: consumption and investment. In the chapter on measuring total output and

income, we learned that real GDP and real GDI are the same thing. With no government or foreign sector, GDI in this economy and DPI would be nearly the same. To simplify further, we will assume that depreciation and undistributed corporate profits (retained earnings) are zero. Thus, for this example, we assume that DPI and real GDP are identical.

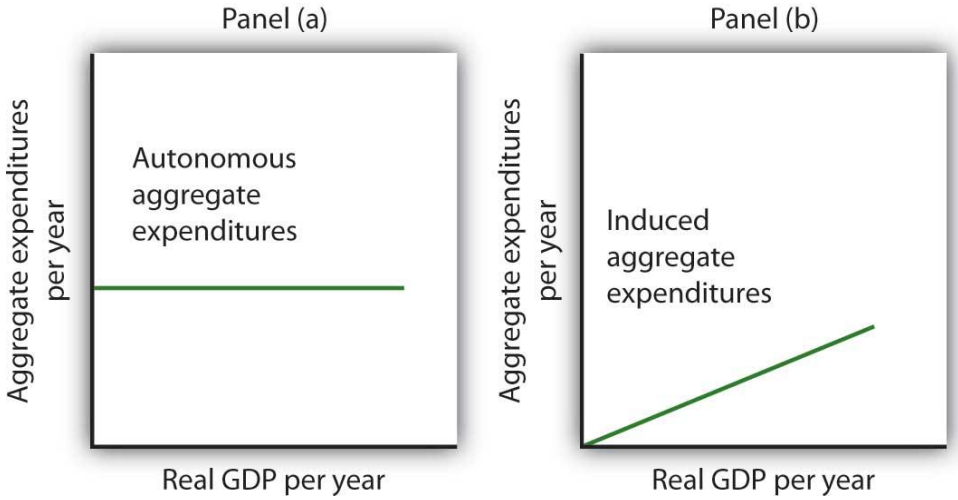
Finally, we shall also assume that the only component of AE that may not be at the planned level is investment. Firms determine a level of investment they intend to make in each period. The level of investment firms intend to make in a period is called planned investment. Some investment is unplanned. Suppose, for example, that firms produce and expect to sell more goods during a period than they actually sell. The unsold goods will be added to the firms' inventories, and they will thus be counted as part of investment. Unplanned investment is investment during a period that firms did not intend to make. It is also possible that firms may sell more than they had expected. In this case, inventories will fall below what firms expected, in which case, unplanned investment would be negative. Investment during a period equals the sum of planned investment ($\boldsymbol{I_P}$) and unplanned investment ($\boldsymbol{I_U}$): $\boldsymbol{I = I_P + I_U}$ We shall find that planned and unplanned investment play key roles in the ***AE*** model.

Autonomous and Induced AE

Economists distinguish two types of expenditures. Expenditures that do not vary with the level of real GDP are called autonomous AE. In our example, we assume that planned investment expenditures are autonomous. Expenditures that vary with real GDP are called induced AE. Consumption spending that rises with real GDP is an example of an induced aggregate expenditure.

Figure 3.4 *Autonomous and Induced AE* illustrates the difference between autonomous and induced AE. With real GDP on the horizontal axis and AE on the vertical axis, autonomous AE are shown as a horizontal line in Panel (a). A curve showing induced AE has a slope greater than zero; the value of an induced aggregate expenditure changes with changes in real GDP. Panel (b) shows induced AE that are positively related to real GDP.

Figure 3.4 *Autonomous and Induced AE*



Autonomous and Induced Consumption

The concept of the *MPC* suggests that consumption contains induced AE; an increase in real GDP raises consumption. But consumption contains an autonomous component as well. The level of consumption at the intersection of the consumption function and the vertical axis is regarded as autonomous consumption; this level of spending would occur regardless of the level of real GDP.

Consider the consumption function we used in deriving the schedule and curve illustrated in Figure *Plotting a Consumption Function*:

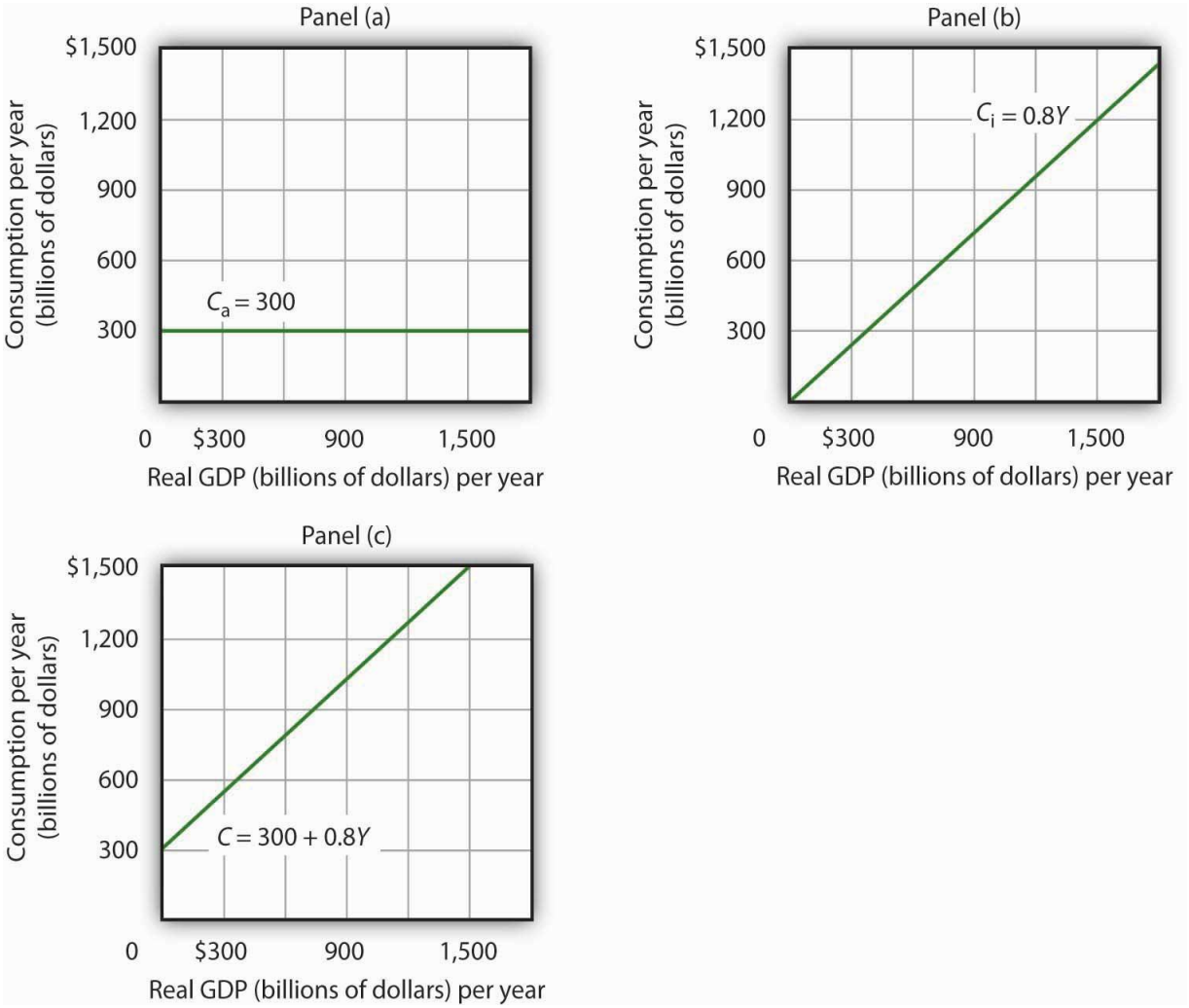
$$C = \$300 \text{ billion} + 0.8Y$$

We can omit the subscript on DPI because of the simplifications we have made in this section, and the symbol ***Y*** can be thought of as representing both DPI and GDP. Because we assume that the price level in the ***AE*** model is constant, GDP equals real GDP. At every level of real GDP, consumption includes $300 billion in autonomous AE. It will also contain expenditures "induced" by the level of real GDP. At a level of real GDP of $2,000 billion, for example, consumption equals $1,900 billion: $300 billion in autonomous AE and $1,600 billion in consumption induced by the $2,000 billion level of real GDP.

Figure 3.5 *Autonomous and Induced Consumption* illustrates these two components of consumption. Autonomous consumption, ***C*a**, which is always $300 billion, is shown in Panel (a); its equation is ***C*a = $300 billion.** Induced

consumption ***Ci*** is shown in Panel (b); its equation is ***Ci = 0.8Y.*** The consumption function is given by the sum of the equations; it is shown in Panel (c) of Figure *Autonomous and Induced Consumption*. It is the same as the equation C = \$300 billion + 0.8Yd, since in this simple example, Y and Yd are the same.

Figure 3.5 *Autonomous and Induced Consumption*



Plotting the AE Curve

In this simplified economy, investment is the only other component of AE. We shall assume that investment is autonomous and that firms plan to invest \$1,100 billion per year. So **I_P = \$1,100 billion.**

The level of planned investment is unaffected by the level of real GDP.

AE equal the sum of consumption C and planned investment I_P. The AE function is the relationship of AE to the value of real GDP. It can be represented with an equation, as a table, or as a curve.

We begin with the definition of AE ***AE*** when there is no government or foreign sector: $\boldsymbol{AE=C+I_P}$

Substituting the information from above on consumption and planned investment yields (throughout this discussion all values are in billions of base-year dollars):

$$\boldsymbol{AE = \$300 + 0.8Y + \$1{,}100} \text{ or } \boldsymbol{AE = \$1{,}400 + 0.8Y}$$

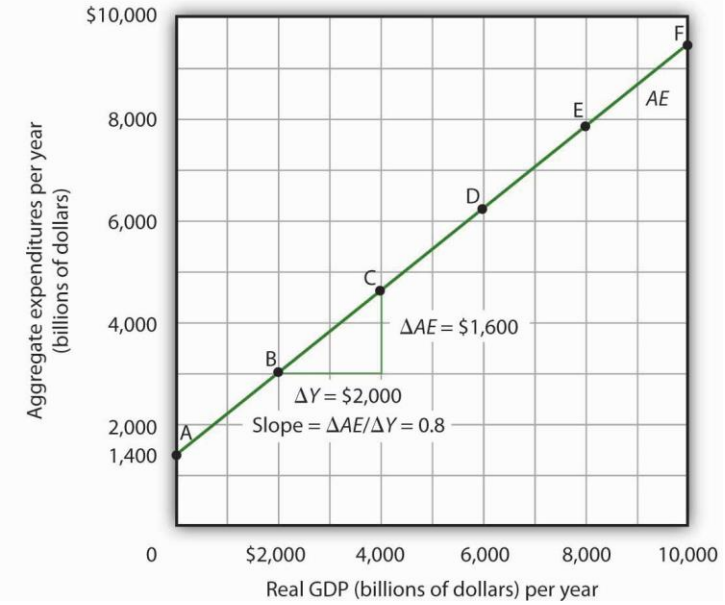
The equation is the algebraic representation of the AE function. We shall use this equation to determine the equilibrium level of real GDP in the ***AE*** model. It is important to keep in mind that AE measure total planned spending at each level of real GDP (for any given price level). Real GDP is total production. AE and real GDP need not be equal, and indeed will not be equal except when the economy is operating at its equilibrium level, as we will see in the next section.

In the equation, the autonomous component of AE is $1,400 billion, and the induced component is $0.8Y$. We shall plot this AE function. To do so, we arbitrarily select various levels of real GDP and then use the equation to compute AE at each level. At a level of real GDP of $6,000 billion, for example, AE equal $6,200 billion:

$$\boldsymbol{AE = \$1{,}400 + 0.8\ (\$6{,}000) = \$6{,}200}$$

Figure 3.6 *Plotting the AE Curve*

Point on curve	A	B	C	D	E	F
Y (billions)	$0	2,000	4,000	6,000	8,000	10,000
AE (billions)	$1,400	3,000	4,600	6,200	7,800	9,400



The table in Figure 3.6 *Plotting the AE Curve* shows the values of AE at various levels of real GDP. Based on these values, we plot the AE curve. To obtain each value for AE, we simply insert the corresponding value for real GDP into the equation. The value at which the AE curve intersects the vertical axis corresponds to the level of autonomous AE. In our example, autonomous AE equal $1,400 billion. That figure includes $1,100 billion in planned investment, which is assumed to be autonomous, and $300 billion in autonomous consumption expenditure.

The Slope of the AE Curve

The slope of the AE curve, given by the change in AE divided by the change in real GDP between any two points, measures the additional expenditures induced by increases in real GDP. The slope for the AE curve in Figure *Plotting the AE Curve* is shown for points B and C: it is 0.8.

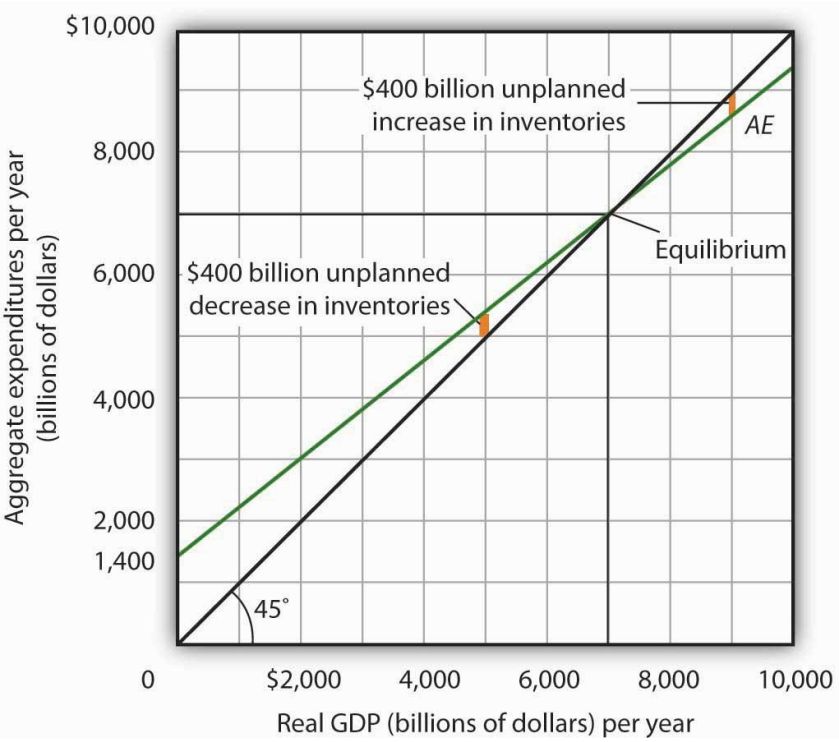
In this figure, the slope of the AE curve equals the *MPC*. This is because we have assumed that the only other expenditure, planned investment, is autonomous and that real GDP and DPI are identical. Changes in real GDP thus affect only consumption in this simplified economy.

Equilibrium in the AE Model

Real GDP is a measure of the total output of firms. AE equal total planned spending on that output. Equilibrium in the model occurs where AE in some period equal real GDP in that period. One way to think about equilibrium is to recognize that firms, except for some inventory that they plan to hold, produce goods and services with the intention of selling them. AE consist of what people, firms, and government agencies plan to spend. If the economy is at its equilibrium real GDP, then firms are selling what they plan to sell (that is, there are no unplanned changes in inventories).

Figure 3.7 *Determining Equilibrium in the AE Model* illustrates the concept of equilibrium in the ***AE*** model. A 45-degree line connects all the points at which the values on the two axes, representing AE and real GDP, are equal. Equilibrium must occur at some point along this 45-degree line. The point at which the AE curve crosses the 45-degree line is the equilibrium real GDP, here achieved at a real GDP of $7,000 billion.

Figure 3.7 *Determining Equilibrium in the AE Model*



The equation tells us that at a real GDP of $7,000 billion, the sum of consumption and planned investment is $7,000 billion – precisely the level of output firms produced. At that level of output, firms sell what they planned to sell and keep inventories that they planned to keep. A real GDP of $7,000 billion represents equilibrium in the sense that it generates an equal level of AE.

If firms were to produce a real GDP greater than $7,000 billion per year, AE would fall short of real GDP. At a level of real GDP of $9,000 billion per year, for example, AE equal $8,600 billion. Firms would be left with $400 billion worth of goods they intended to sell but did not. Their actual level of investment would be $400 billion greater than their planned level of investment. With those unsold goods on hand (that is, with an unplanned increase in inventories), firms would be likely to cut their output, moving the economy toward its equilibrium GDP of $7,000 billion. If firms were to produce $5,000 billion, AE would be $5,400 billion. Consumers and firms would demand more than was produced; firms would respond by reducing their inventories below the planned level (that is, there would be an unplanned decrease in inventories) and increasing their output in subsequent periods, again moving the economy toward its equilibrium real GDP of $7,000 billion.

Figure 3.8 *Adjusting to Equilibrium Real GDP* shows possible levels of real GDP in the economy for the AE function illustrated in Figure *Determining Equilibrium in the AE Model*. It shows the level of AE at various levels of real GDP and the direction in which real GDP will change whenever ***AE*** does not equal real GDP. At any level of real GDP other than the equilibrium level, there is unplanned investment.

Figure 3.8 *Adjusting to Equilibrium Real GDP*

If real GDP is	Consumption expenditures will be	Planned investment will be	Aggregate expenditures will equal	Unplanned investment will be	Real GDP will
$9,000	$7,500	$1,100	$8,600	$400	Fall ↓
8,000	6,700	1,100	7,800	200	Fall ↓
7,000	5,900	1,100	7,000	0	Remain unchanged
6,000	5,100	1,100	6,200	−200	Rise ↑
5,000	4,300	1,100	5,400	−400	Rise ↑

To sum up, each level of real GDP will result in a particular amount of AE. If AE are less than the level of real GDP, firms will reduce their output and real GDP will fall. If AE exceed real GDP, then firms will increase their output and real GDP will rise. If AE equal real GDP, then firms will leave their output unchanged; we have achieved equilibrium in the AE model. At equilibrium, there is no unplanned investment. Here, that occurs at a real GDP of $7,000 billion.

UNIT 3.3 The AE Model and the multiplier

Learning objectives

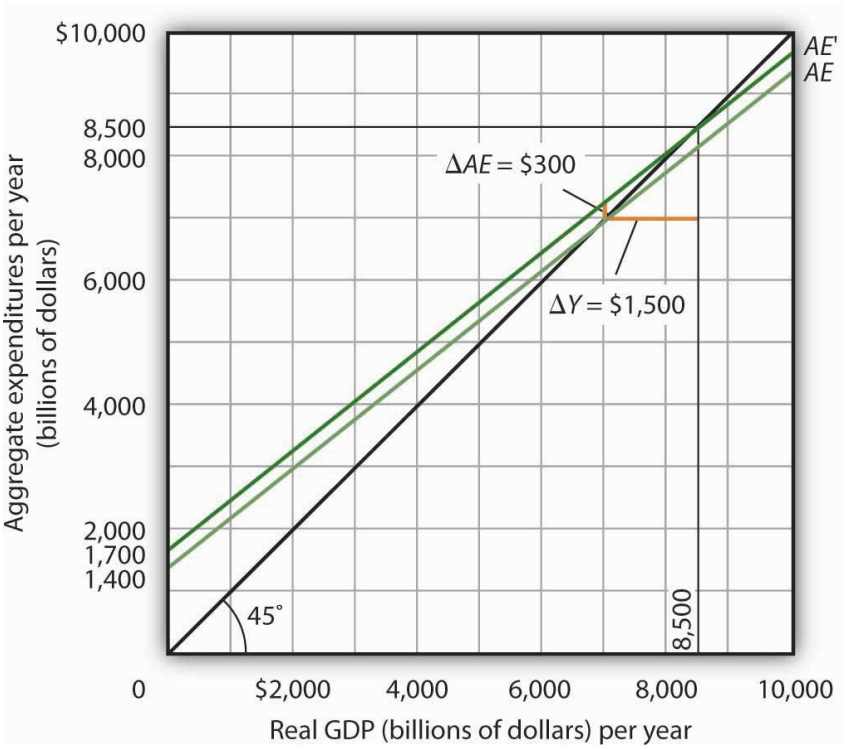
1. Explain and illustrate how changes in the components of aggregate expenditures model will affect the equilibrium real GDP.
2. Explain why a change in autonomous expenditures leads to a multiplied change in equilibrium real GDP.

In the ***AE*** model, equilibrium is found at the level of real GDP at which the AE curve crosses the 45-degree line. It follows that a shift in the curve will change equilibrium real GDP. Here we will examine the magnitude of such changes.

Figure 3.9 *A Change in Autonomous AE Changes Equilibrium Real GDP* begins with the AE curve shown in Figure 3.7 *Determining Equilibrium in the AE Model* in Unit 3.2. Now suppose that planned investment increases from the original value of $1,100 billion to a new value of $1,400 billion – an increase of $300 billion. This increase in planned investment shifts the AE curve upward by $300 billion, all other things unchanged. Notice that the new AE curve intersects the 45-degree line at a real GDP of $8,500 billion. The $300 billion increase in planned investment has produced an increase in equilibrium real GDP of $1,500 billion.

How could an increase in AE of $300 billion produce an increase in equilibrium real GDP of $1,500 billion? The answer lies in the operation of the multiplier. Because firms have increased their demand for investment goods (that is, for capital) by $300 billion, the firms that produce those goods will have $300 billion in additional orders. They will produce $300 billion in additional real GDP and, given our simplifying assumption, $300 billion in additional DPI. But in this economy, each $1 of additional real GDP induces $0.80 in additional consumption. The $300 billion increase in autonomous AE initially induces $240 billion (= 0.8 × $300 billion) in additional consumption.

Figure 3.9 *A Change in Autonomous AE Changes Equilibrium Real GDP*



The $240 billion in additional consumption boosts production, creating another $240 billion in real GDP. But that second round of increase in real GDP induces $192 billion (= 0.8 × $240) in additional consumption, creating still more production, still more income, and still more consumption. Eventually (after many additional rounds of increases in induced consumption), the $300 billion increase in AE will result in a $1,500 billion increase in equilibrium real GDP. Table 3.1 *The Multiplied Effect of an Increase in Autonomous AE* shows the multiplied effect of a $300 billion increase in autonomous AE, assuming each $1 of additional real GDP induces $0.80 in additional consumption.

The size of the additional rounds of expenditure is based on the slope of the ***AE*** function, which in this example is simply the MPC.

Table 3.1 *The Multiplied Effect of an Increase in Autonomous AE*

Round of spending	Increase in real GDP (billions of dollars)
1	300
2	240
3	192
4	154
5	123
6	98
7	79
8	63
9	50
10	40
11	32
xcdf12	26
Subsequent rounds	**+103**
Total increase in real GDP	**1,500**

This process could also work in reverse. That is, a decrease in planned investment would lead to a multiplied decrease in real GDP. A reduction in planned investment would reduce the incomes of some households. They would reduce their consumption by the *MPC* times the reduction in their income. That, in turn, would reduce incomes for households that would have received the spending by the first group of households. The process continues, thus multiplying the impact of the reduction in AE resulting from the reduction in planned investment.

Computation of the Multiplier

The multiplier is the number by which we multiply an initial change in aggregate demand to get the full amount of the shift in the AD demand curve. Because the multiplier shows the amount by which the AD demand curve shifts at a given price level, and the ***AE*** model assumes a given price level, we can use the ***AE*** model to derive the multiplier explicitly.

Let *Ye* be the equilibrium level of real GDP in the ***AE*** model, and let ***AEa*** be autonomous AE. Then the multiplier is:

$$\textit{Multiplier} = \Delta Ye / \Delta AEa$$

In the example we have just discussed, a change in AEa of $300 billion produced a change in equilibrium real GDP of $1,500 billion. The value of the multiplier is therefore $1,500 / $300 = 5.

The multiplier effect works because a change in AEa causes a change in real GDP and DPI, inducing a further change in the level of AE, which creates still more GDP and thus an even higher level of AE. The degree to which a given change in real GDP induces a change in AE is given in this simplified economy by the MPC, which, in this case, is the slope of the AE curve. The slope of the AE curve is thus linked to the size of the multiplier. We turn now to an investigation of the relationship between the MPC and the multiplier.

UNIT 3.4 THE AE MODEL IN A MORE REALISTIC ECONOMY

Learning objectives

1. Explain the conclusions which emerge from the application of the ***AE*** model to the simplified economy.
2. Discuss how adding taxes, government purchases, and net exports to a simplified aggregate expenditures model affects the multiplier and hence the impact on real GDP that arises from an initial change in autonomous expenditures.

Four conclusions emerge from our application of the ***AE*** model to the simplified economy presented so far. These conclusions can be applied to a more realistic view of the economy.

1. The AE function relates AE to real GDP. The intercept of the AE curve shows the level of AEa. The slope of the AE curve shows how much increases in real GDP induce additional AE.
2. Equilibrium real GDP occurs where AE equal real GDP.
3. A change in AEa changes equilibrium real GDP by a multiple of the change in AEa.
4. The size of the multiplier depends on the slope of the AE curve. The steeper the AE curve, the larger the multiplier; the flatter the AE curve, the smaller the multiplier.

These four points still hold as we add the two other components of AE – government purchases and net exports – and recognize that government not only spends but also collects taxes. We look first at the effect of adding taxes to the ***AE*** model and then at the effect of adding government purchases and net exports.

Taxes and the Aggregate Expenditure Function

Suppose that the only difference between real GDP and DPI is personal income taxes. Let us see what happens to the slope of the AE function.

As before, we assume that the MPC is 0.8, but we now add the assumption that income taxes take ¼ of real GDP. This means that for every additional $1 of real GDP, DPI rises by $0.75 and, in turn, consumption rises by $0.60 (= 0.8 × $0.75). In

the simplified model in which DPI and real GDP were the same, an additional $1 of real GDP raised consumption by $0.80. The slope of the AE curve was 0.8, the MPC. Now, as a result of taxes, the AE curve will be flatter than the one shown in Figure *Plotting the AE Curve* and Figure *Adjusting to Equilibrium Real GDP*. In this example, the slope will be 0.6; an additional $1 of real GDP will increase consumption by $0.60.

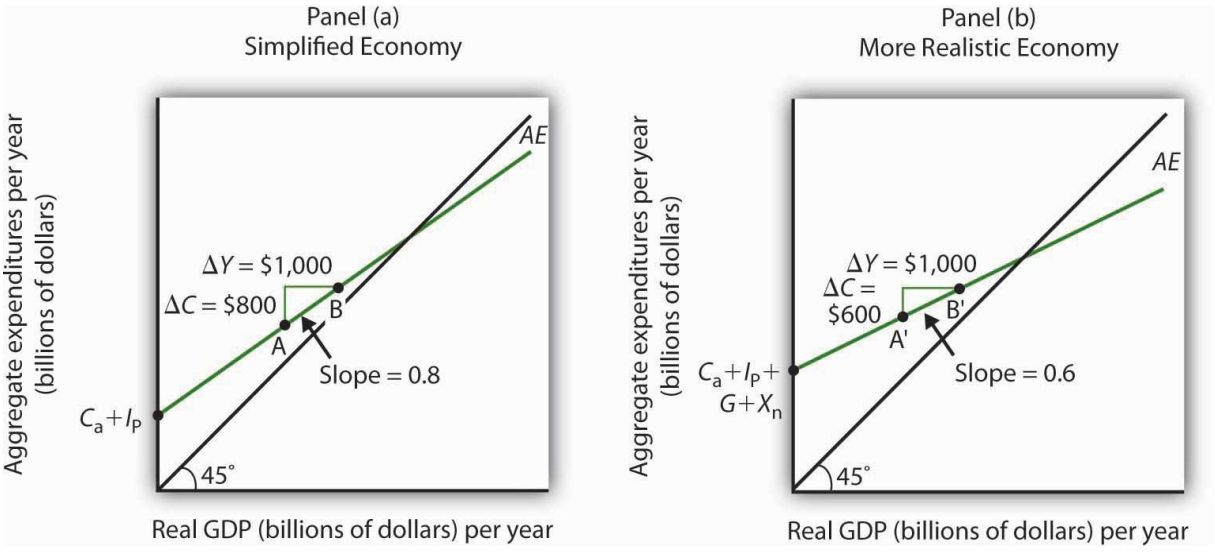
Other things the same, the multiplier will be smaller than it was in the simplified economy in which DPI and real GDP were identical.

The Addition of Government Purchases and Net Exports

Suppose that government purchases and net exports are autonomous. If so, they enter the AE function in the same way that investment did. Compared to the simplified ***AE*** model, the AE curve shifts up by the amount of government purchases and net exports.

Figure 3.10 *The AE Function: Comparison of a Simplified Economy and a More Realistic Economy* shows the difference between the ***AE*** model of the simplified economy in Figure *Determining Equilibrium in the AE Model* and a more realistic view of the economy. Panel (a) shows an *AE* curve for an economy with only consumption and investment expenditures. In Panel (b), the *AE* curve includes all four components of AE.

Figure 3.10 *The AE Function: Comparison of a Simplified Economy and a More Realistic Economy*



There are two major differences between the AE curves shown in the two panels. Notice first that the intercept of the *AE* curve in Panel (b) is higher than that of the *AE* curve in Panel (a). The reason is that, in addition to the autonomous part of consumption and planned investment, there are two other components of AE – government purchases and net exports – that we have also assumed are autonomous. Thus, the intercept of the AE curve in Panel (b) is the sum of the four autonomous AE components: consumption (***Ca***), planned investment (*Ip*), government purchases (*G*), and net exports (*Xn*). In Panel (a), the intercept includes only the first two components.

Second, notice that the slope of the AE curve is flatter for the more realistic economy in Panel (b) than it is for the simplified economy in Panel (a). This can be seen by comparing the slope of the AE curve between points A and B in Panel (a) to the slope of the AE curve between points A′ and B′ in Panel (b). Between both sets of points, real GDP changes by the same amount, $1,000 billion. In Panel (a), consumption rises by $800 billion, whereas in Panel (b) consumption rises by only $600 billion. This difference occurs because, in the more realistic view of the economy, households have only a fraction of real GDP available as DPI. Thus, for a given change in real GDP, consumption rises by a smaller amount.

Key concepts

- The ***AE*** model relates AE to real GDP. Equilibrium in the model occurs where AE equal real GDP and is found graphically at the intersection of the AE curve and the 45-degree line.
- Economists distinguish between autonomous and induced AE. The former do not vary with GDP; the latter do.
- Equilibrium in the ***AE*** model implies that unintended investment equals zero.
- A change in autonomous AE leads to a change in equilibrium real GDP, which is a multiple of the change in autonomous AE.
- The size of the multiplier depends on the slope of the AE curve. In general, the steeper the AE curve, the greater the multiplier. The flatter the AE curve, the smaller the multiplier.
- Income taxes tend to flatten the AE curve.

Chapter 3. A Multiple Choice Test

1. Consumption is:

a) part of household income spent on the purchase of goods and services in the current period;

b) part of the income intended for the purchase of goods and services in the future period;

c) the balance of income accumulated in bank accounts.

2. Savings are:

a) all accumulated household assets and household savings;

b) real cash balances of all market entities;

c) part of income invested in securities;

d) part of household income not spent in a given period of time.

3. Consumption and savings:

a) in total are equal to the amount of income;

b) are always more than income in the context of economic growth;

c) are always less than income;

4. The marginal propensity to save (MPS):

a) is always less than 1;

b) always equals to 0;

c) equals 1.

5.The marginal propensity to consume (MPC) is:

(a) growth in consumption relative to savings;

b) the ratio between consumption and income;

c) growth of consumption per unit of income growth;

6. What is the relationship between the MPC and MPS?

a) their amount is equal to disposable income;

b) the relationship between them characterizes the average propensity to consumption;

c) their sum equals 1;

d) their sum is 0.

7.The relationship between consumption and saving in the context of economic growth:

a) changes;

b) equal to one;

c) more than one.

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **MPC:** The marginal propensity to consume (MPC) is 0.6. What is the marginal propensity to save (MPS)?

2. **MPC and MPS:** In a closed economy with no government expenditures or taxation, national income rises by $100 million and consumer expenditure rises by $25 million. In this case, what is the MPC and the MPS?

3.**AE curve:** Suppose you are given the following data for an economy. All data are in billions of dollars.

Y is actual real GDP, and ***C, IP, G,*** and ***Xn*** are the consumption, planned investment, government purchases, and net exports as components of AE, respectively.

Y	***C***	***Ip***	***G***	***Xn***	***AE***
$0	$800	$1,000	$1,400	-$200	
2,500	2,300	1,000	1,400	-$200	
5,000	3,800	1,000	1,400	-$200	
7,500	5,300	1,000	1,400	-$200	
10,000	6,800	1,000	1,400	-$200	

Plot the aggregate expenditures curve and draw in the 45-degree line.

1) What is the intercept of the AE curve when Y=0?
2) What is its slope?
3) Determine the equilibrium level of real GDP.
4) Now suppose that net exports fall by $1,000 billion and that this is the only change in autonomous aggregate expenditures. Plot the new aggregate expenditures curve. What is the new equilibrium level of real GDP?
5) What is the value of the multiplier?

4. **Savings function:** With the income being 180 money units, savings equal 20 money units. Suppose income decreases to 80 money units, savings drop to zero. Compute the savings function.

5. **Consumption function:** For each of the following events, draw a curve representing the consumption function and show how the event would affect the curve.

1. A sharp increase in stock prices increases the real wealth of most households.
2. Consumers decide that a recession is ahead and that their incomes are likely to fall.
3. The price level falls.

6. **MPC and MPS:** Suppose the following information describes a simple economy. Figures are in billions of dollars.

Disposable personal income	Consumption
0	100
100	120
200	140
300	160

1. What is the marginal propensity to consume?
2. What is the marginal propensity to save?
3. Write an equation that describes consumption?
4. Write an equation that describes saving?

7. **Planned investment:** In a closed economy with no government purchases, consumption is always ¾ of Disposable Personal Income (whatever the level of national income). The economy is in equilibrium where national income equals $200 billion. Calculate the level of planned investment.

CHAPTER 4. INVESTMENT AS A COMPONENT OF AD

UNIT 4.1 The Nature of Investment

Learning objectives

1. Discuss the components of the investment spending category of GDP and distinguish between gross and net investment.
2. Discuss the relationship between consumption, saving, and investment, and explain the relationship using the production possibilities model.

Investment adds to the nation's capital stock. We saw in the chapter on economic growth that an increase in capital shifts the aggregate production function (PF) outward, increases the demand for labor, and shifts the *LRAS* curve to the right. Investment therefore affects the economy's potential output and thus its standard of living in the long run.

Investment is a component of aggregate demand. Changes in investment shift the aggregate demand curve and thus change real GDP and the price level in the short run. An increase in investment shifts the aggregate demand curve to the right; a reduction shifts it to the left.

Components of Investment

Additions to the stock of private capital are called Gross Private Domestic Investment (GPDI). GPDI includes four categories of investment:

1. *Nonresidential Structures* includes the construction of business structures such as private office buildings, warehouses, factories, private hospitals and universities, and other structures in which the production of goods and services takes place. Recall that investment is part of GDP, and GDP is the value of production in any period.
2. *Nonresidential Equipment and Software*. Producers' equipment includes computers and software, machinery, trucks, cars, and desks, that is, any business equipment.
3. *Residential Investment*. This category includes all forms of residential construction, whether apartment houses or single-family homes, as well as residential equipment such as computers and software.

4. *Change in Private Inventories*. Private inventories are considered part of the nation's capital stock, because those inventories are used to produce other goods. All private inventories are capital; additions to private inventories are thus investment. When private inventories fall, that is recorded as negative investment.

Gross and Net Investment

As capital is used, some of it wears out or becomes obsolete; it depreciates; depreciation being "consumption of fixed capital". Investment adds to the capital stock, and depreciation reduces it. Gross investment minus depreciation is **net investment**. If gross investment is greater than depreciation in any period, then net investment is positive and the capital stock increases. If gross investment is less than depreciation in any period, then net investment is negative and the capital stock declines. In the official estimates of total output, gross investment (GPDI) minus depreciation equals **net private domestic investment** (NPDI).

The Volatility of Investment

Investment, measured as GPDI, is among the most volatile components of GDP. In percentage terms, year-to-year changes in GPDI are far greater than the year-to-year changes in consumption or government purchases. Net exports are also quite volatile, but they represent a much smaller share of GDP.

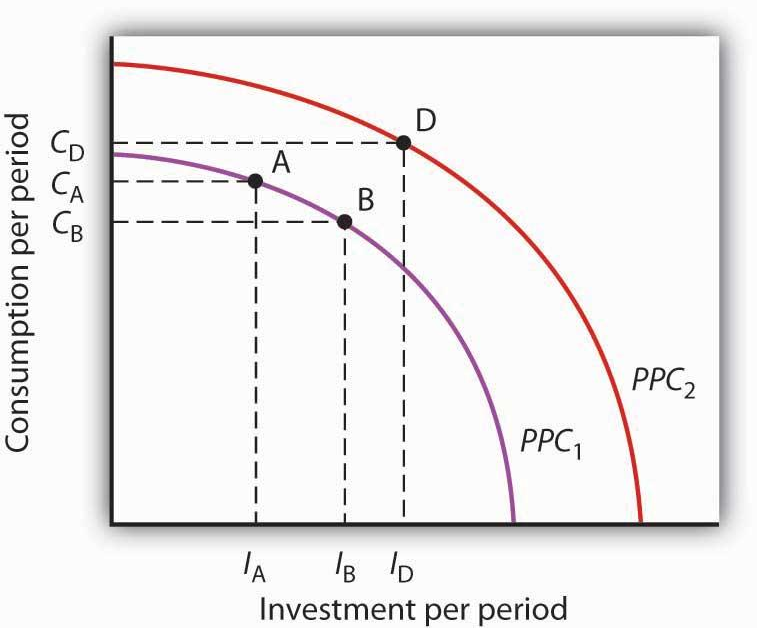
Given that the AD curve shifts by an amount equal to the multiplier times an initial change in investment, the volatility of investment can cause real GDP to fluctuate in the short run. Downturns in investment may trigger recessions.

Investment, Consumption, and Saving

Earlier we used the production possibilities curve to illustrate how choices are made about investment, consumption, and saving. Figure 4.1 *The Choice between Consumption and Investment* shows a production possibilities curve PPC for an economy that can produce two kinds of goods: *consumption goods* and *investment goods*. An economy operating at point A on PPC_1 is using its factors of production fully and efficiently. It is producing CA units of consumption goods and IA units of investment each period. Suppose that depreciation equals Ia, so that the quantity of investment each period is just sufficient to replace depreciated capital; net investment

equals zero. If there is no change in the labor force, in natural resources, or in technology, the production possibilities curve will remain fixed at PPC_1.

Figure 4.1 *The Choice between Consumption and Investment*



Now suppose decision makers in this economy decide to sacrifice the production of some consumption goods in favor of greater investment. The economy moves to point B on PPC_1. Production of consumption goods falls to CB, and investment rises to I_B. Assuming depreciation remains IA, net investment is now positive. As the nation's capital stock increases, the production possibilities curve shifts outward to PPC_2. Once that shift occurs, it will be possible to select a point such as D on the new production possibilities curve. At this point, consumption equals C_D, and investment equals I_D. By sacrificing consumption early on, the society is able to increase both its consumption and investment in the future. That early reduction in consumption requires an *increase* in saving.

We see that a movement along the production possibilities curve in the direction of the production of more investment goods and fewer consumption goods allows the production of more of both types of goods in the future.

Key concepts

- Investment adds to the nation's capital stock.

- Gross private domestic investment includes the construction of nonresidential structures, the production of equipment and software, private residential construction, and changes in inventories.
- Investment is the most volatile component of GDP.
- Investment represents a choice to postpone consumption – it requires saving.

UNIT 4.2 DETERMINANTS OF INVESTMENT

Learning objectives

1. Draw a hypothetical investment demand curve, and explain what it shows about the relationship between investment and the interest rate.
2. Discuss the factors that can cause an investment demand curve to shift.

Interest rates play a key role in the determination of the desired stock of capital and thus of investment. Because investment is a process through which capital is increased in one period for use in future periods, expectations play an important role in investment as well.

Capital is one factor of production, along with labor and natural resources. A decision to invest is a decision to use more capital in producing goods and services. Factors that affect firms' choices in the mix of capital, labor, and natural resources will affect investment as well.

Public policy affects investment. Some investment is done by government agencies as they add to the public stock of capital. In addition, the tax and regulatory policies chosen by the public sector can affect the investment choices of private firms and individuals.

Interest Rates and Investment

There is a negative relationship between interest rates and investment. This relationship applies to all forms of investment: higher interest rates tend to reduce the quantity of investment, while lower interest rates increase it.

To see the relationship between interest rates and investment, suppose you own a small factory and are considering the installation of a solar energy collection system to heat your building. You have determined that the cost of installing the system

would be $10,000 and that the system would lower your energy bills by $1,000 per year. To simplify the example, we shall suppose that these savings will continue forever and that the system will never need repair or maintenance. Thus, we need to consider only the $10,000 purchase price and the $1,000 annual savings. If the system is installed, it will be an addition to the capital stock and will therefore be counted as investment. Should you purchase the system?

Suppose that your business already has the $10,000 on hand. You are considering whether to use the money for the solar energy system or for the purchase of a bond. Your decision to purchase the system or the bond will depend on the interest rate you could earn on the bond.

Putting $10,000 into the solar energy system generates an effective income of $1,000 per year – the saving the system will produce. That is a return of 10% per year. Suppose the bond yields a 12% annual interest. It thus generates interest income of $1,200 per year, enough to pay the $1,000 in heating bills and have $200 left over. At an interest rate of 12%, the bond is the better purchase. If, however, the interest rate on bonds were 8%, then the solar energy system would yield a higher income than the bond. At interest rates below 10%, you will invest in the solar energy system. At interest rates above 10%, you will buy a bond instead. At an interest rate of precisely 10%, it is a toss-up.

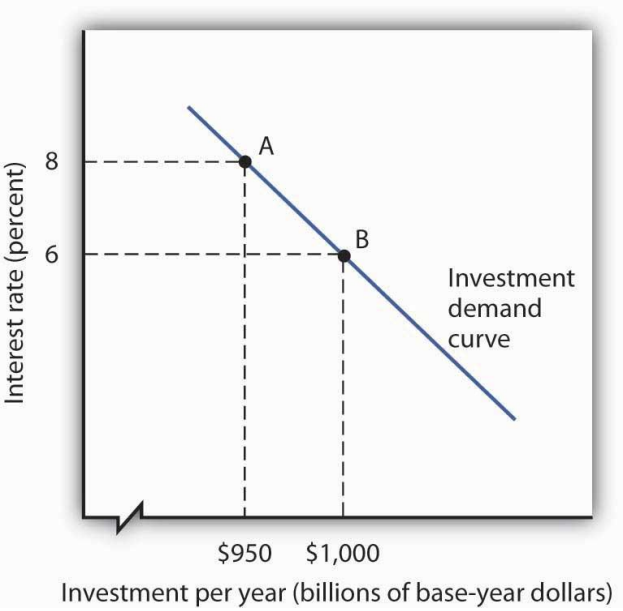
If you do not have the $10,000 on hand and would need to borrow the money to purchase the solar energy system, the interest rate still governs your decision. At interest rates below 10%, it makes sense to borrow the money and invest in the system. At interest rates above 10%, it does not.

In effect, the interest rate represents the opportunity cost of putting funds into the solar energy system rather than into a bond. The cost of putting the $10,000 into the system is the interest you would forgo by not purchasing the bond.

Figure 4.2 *The Investment Demand Curve* shows an investment demand curve for the economy – a curve that shows the quantity of investment demanded at each interest rate, with all other determinants of investment unchanged. At an interest rate of 8%, the level of investment is $950 billion per year at point A. At a lower interest

rate of 6%, the investment demand curve shows that the quantity of investment demanded will rise to $1,000 billion per year at point B. A reduction in the interest rate thus causes a movement along the investment demand curve.

Figure 4.2 *The Investment Demand Curve*



Note! To make sense of the relationship between interest rates and investment, you must remember that investment is an addition to capital, and that capital is something that has been produced in order to produce other goods and services. A bond is not capital. The purchase of a bond is not an investment. Purchasing bonds is a financial investment – that is, as an alternative to investment. The more attractive bonds are (i.e., the higher their interest rate), the less attractive investment becomes. If we forget that investment is an addition to the capital stock and that the purchase of a bond is not investment, we can fall into the following kind of error: *Higher interest rates mean a greater return on bonds, so more people will purchase them. Higher interest rates will therefore lead to greater investment.* That is a mistake, of course, because the purchase of a bond is not an investment. Higher interest rates increase the opportunity cost of using funds for investment. They reduce investment.

Other Determinants of Investment Demand

Perhaps the most important characteristic of the investment demand curve is not its negative slope, but rather the fact that it shifts often. Although investment

certainly responds to changes in interest rates, changes in other factors appear to play a more important role in driving investment choices.

This section examines eight additional determinants of investment demand: expectations, the level of economic activity, the stock of capital, capacity utilization, the cost of capital goods, other factor costs, technological change, and public policy. A change in any of these can shift the investment demand curve.

1) Expectations

A change in the capital stock changes future production capacity. Therefore, plans to change the capital stock depend crucially on expectations. As expectations change in a way that increases the expected return from investment, the investment demand curve shifts to the right. Similarly, expectations of reduced profitability shift the investment demand curve to the left.

2) The Level of Economic Activity

Firms need capital to produce goods and services. An increase in the level of production is likely to boost demand for capital and thus lead to greater investment. Therefore, an increase in GDP is likely to shift the investment demand curve to the right.

To the extent that an increase in GDP boosts investment, the multiplier effect of an initial change in one or more components of aggregate demand will be enhanced. We have already seen that the increase in production that occurs with an initial increase in aggregate demand will increase household incomes, which will increase consumption, thus producing a further increase in aggregate demand. If the increase also induces firms to increase their investment, this multiplier effect will be even stronger.

3) The Stock of Capital

The quantity of capital already in use affects the level of investment in two ways. First, because most investment replaces capital that has depreciated, a greater capital stock is likely to lead to more investment; there will be more capital to replace. But second, a greater capital stock can tend to reduce investment. That is because investment occurs to adjust the stock of capital to its desired level. Given that

desired level, the amount of investment needed to reach it will be lower when the current capital stock is higher.

4) The Cost of Capital Goods

The demand curve for investment shows the quantity of investment at each interest rate, all other things unchanged. A change in a variable held constant in drawing this curve shifts the curve. One of those variables is the cost of capital goods themselves. If, for example, the construction cost of new buildings rises, then the quantity of investment at any interest rate is likely to fall. The investment demand curve thus shifts to the left.

5) Other Factor Costs

Firms have a range of choices concerning how particular goods can be produced. A factory, for example, might use a sophisticated capital facility and relatively few workers, or it might use more workers and relatively less capital. The choice to use capital will be affected by the cost of the capital goods and the interest rate, but it will also be affected by the cost of labor. As labor costs rise, the demand for capital is likely to increase.

6) Technological Change

The implementation of new technology often requires new capital. Changes in technology can thus increase the demand for capital. Advances in computer technology have encouraged massive investments in computers. The development of fiber-optic technology for transmitting signals has stimulated huge investments by telephone and cable television companies.

7) Public Policy

Public policy can have significant effects on the demand for capital. Such policies typically seek to affect the cost of capital to firms. For example, through an introduction of accelerated depreciation which did not change the actual rate at which assets depreciated, but it cut tax payments during the early years of the assets' use and thus reduced the cost of holding capital. Or through changes in taxation in order to reduce the cost of capital for firms. Or through a reduction in taxes on corporate profits (called the corporate income tax) in order to stimulate investment.

Accelerated depreciation and lower taxes on corporate profits all increase the demand for private physical capital.

Key concepts

- The quantity of investment demanded in any period is negatively related to the interest rate. This relationship is illustrated by the investment demand curve.
- A change in the interest rate causes a movement along the investment demand curve. A change in any other determinant of investment causes a shift of the curve.
- The other determinants of investment include expectations, the level of economic activity, the stock of capital, the cost of capital goods, other factor costs, technological change, and public policy.

UNIT 4.3 Investment and the Economy

Learning objectives

1. Explain how investment affects aggregate demand.
2. Explain how investment affects economic growth.

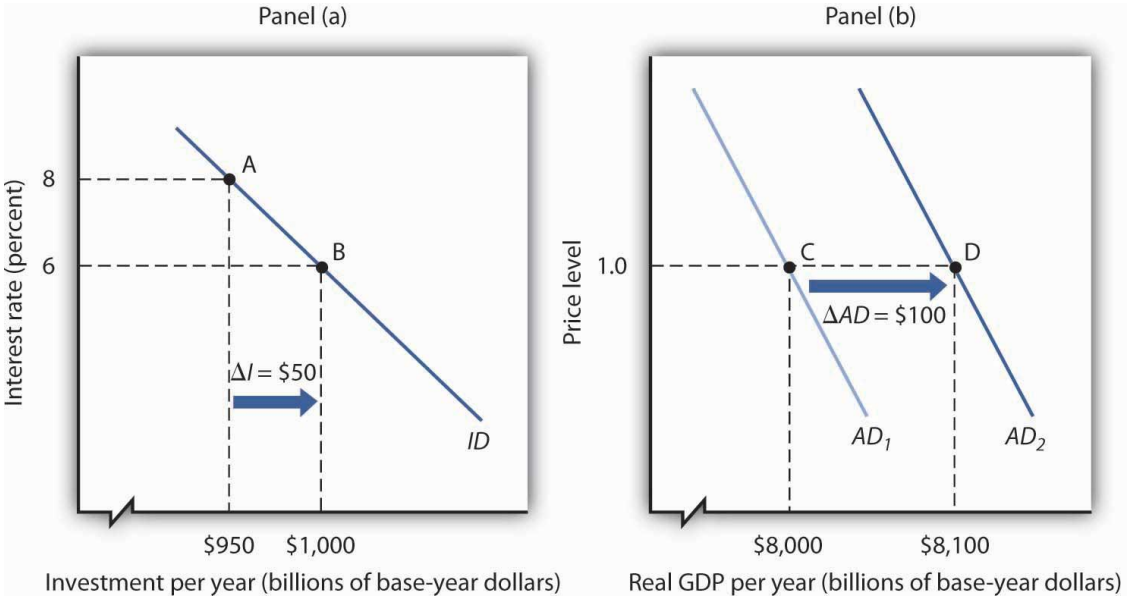
We shall examine the impact of investment on the economy in the context of the model of AD and AS. Investment is a component of AD; changes in investment shift the AD curve by the amount of the initial change times the multiplier. Investment changes the capital stock; changes in the capital stock shift the production possibilities curve and the economy's aggregate PF and thus shift the long- and short-run aggregate supply curves to the right or to the left.

Investment and Aggregate Demand

In the short run, changes in investment cause AD to change. Consider, for example, the impact of a reduction in the interest rate, given the investment demand curve ($\boldsymbol{I_D}$). In Figure 4.3 *A Change in Investment and Aggregate Demand*, Panel (a), which uses the investment demand curve introduced in Figure *The Investment Demand Curve,* a reduction in the interest rate from 8% to 6% increases investment by $50 billion per year. Assume that the multiplier is 2. With an increase in investment of $50 billion per year and a multiplier of 2, the AD curve shifts to the

right by $100 billion to AD_2 in Panel (b). The quantity of real GDP demanded at each price level thus increases. At a price level of 1.0, for example, the quantity of real GDP demanded rises from $8,000 billion to $8,100 billion per year.

Figure 4.3 *A Change in Investment and Aggregate Demand*



A reduction in investment would shift the AD curve to the left by an amount equal to the multiplier times the change in investment.

The relationship between investment and interest rates is one key to the effectiveness of monetary policy to the economy. When the Fed seeks to increase aggregate demand, it purchases bonds. That raises bond prices, reduces interest rates, and stimulates investment and aggregate demand as illustrated in Figure 4.3 *A Change in Investment and Aggregate Demand*. When the Fed seeks to decrease aggregate demand, it sells bonds. That lowers bond prices, raises interest rates, and reduces investment and aggregate demand. The extent to which investment responds to a change in interest rates is a crucial factor in how effective monetary policy is.

Investment and Economic Growth

Investment adds to the stock of capital, and the quantity of capital available to an economy is a crucial determinant of its productivity. Investment thus contributes to economic growth. We saw in Figure 4.1 *The Choice between Consumption and Investment* in Unit 4.1 that an increase in an economy's stock of capital shifts its PPC outward. That also shifts its *LRAS* curve to the right. At the same time, of course, an

increase in investment affects AD, as we saw in Figure 4.3 *A Change in Investment and Aggregate Demand*.

UNIT 4.4 The Bond Market and Macroeconomic Performance

Learning objectives

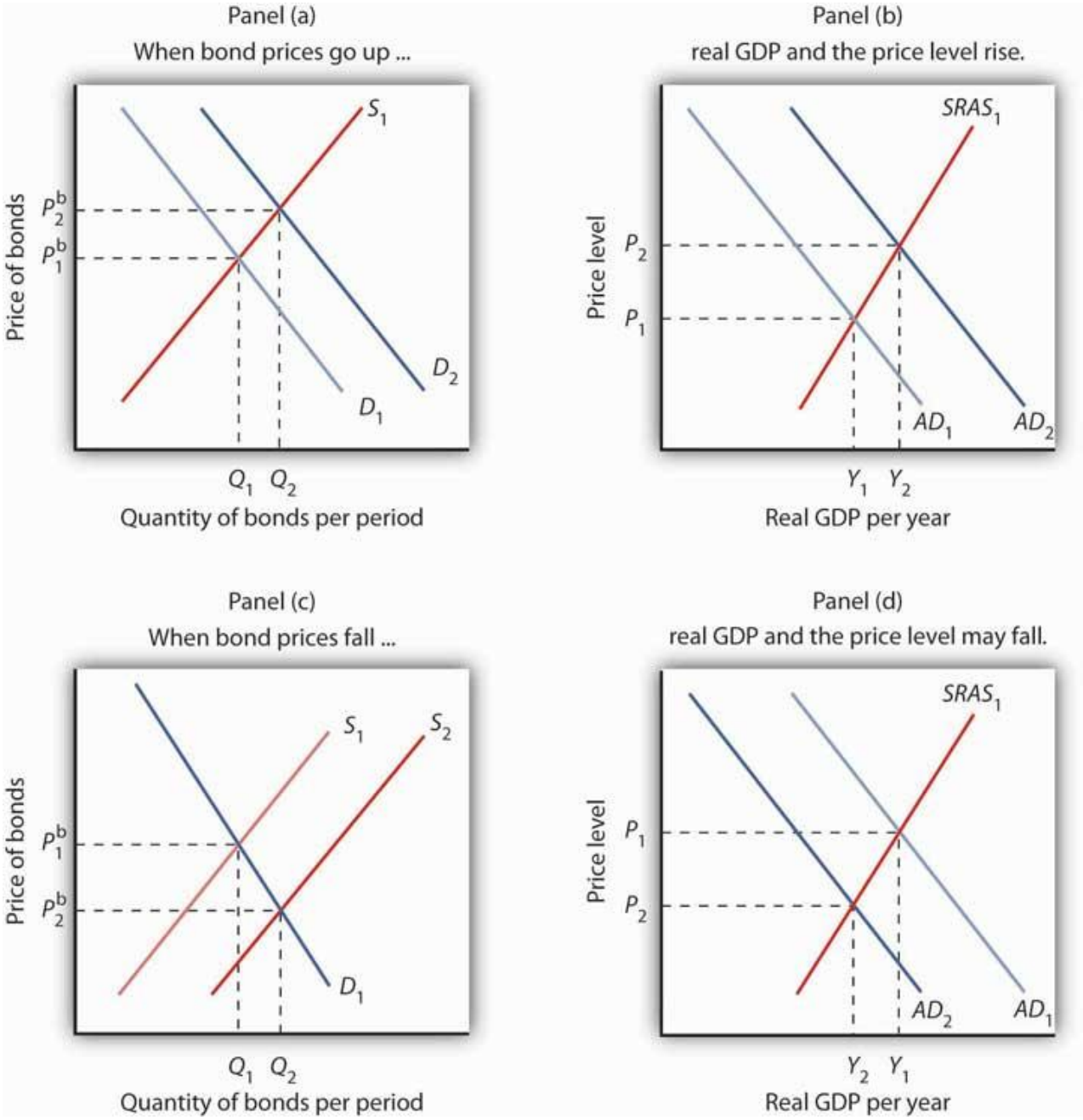
1. Explain and illustrate how the bond market works and discuss the relationship between the price of a bond and that bond's interest rate.
2. Explain and illustrate the relationship between a change in demand for or supply of bonds and macroeconomic activity.

The connection between the bond market and the economy derives from the way interest rates affect aggregate demand. For example, investment is one component of aggregate demand, and interest rates affect investment. Firms are less likely to acquire new capital (that is, plant and equipment) if interest rates are high; they are more likely to add capital if interest rates are low.

If bond prices fall, interest rates go up. Higher interest rates tend to discourage investment, so aggregate demand will fall. A fall in aggregate demand, other things unchanged, will mean fewer jobs and less total output than would have been the case with lower rates of interest. In contrast, an increase in the price of bonds lowers interest rates and makes investment in new capital more attractive. That change may boost investment and thus boost aggregate demand.

Figure 4.4 *Bond Prices and Macroeconomic Activity* shows how an event in the bond market can stimulate changes in the economy's output and price level. In Panel (a), an increase in demand for bonds raises bond prices. Interest rates thus fall. Lower interest rates increase the quantity of investment demanded, shifting the aggregate demand curve to the right, from AD_1 to AD_2 in Panel (b). Real GDP rises from Y_1 to Y_2; the price level rises from P_1 to P_2. In Panel (c), an increase in the supply of bonds pushes bond prices down. Interest rates rise. The quantity of investment is likely to fall, shifting aggregate demand to the left, from AD_1 to AD_2 in Panel (d). Output and the price level fall from Y_1 to Y_2 and from P_1 to P_2, respectively.

Figure 4.4 *Bond Prices and Macroeconomic Activity*



Assuming other determinants of aggregate demand remain unchanged, higher interest rates will tend to reduce aggregate demand and lower interest rates will tend to increase aggregate demand.

Key concepts

- A bond represents a borrower's debt; bond prices are determined by demand and supply.
- The interest rate on a bond is negatively related to the price of the bond. As the price of a bond increases, the interest rate falls.

- An increase in the interest rate tends to decrease the quantity of investment demanded and, hence, to decrease aggregate demand. A decrease in the interest rate increases the quantity of investment demanded and aggregate demand.
- Changes in investment shift the aggregate demand curve to the right or left by an amount equal to the initial change in investment times the multiplier.
- Investment adds to the capital stock; it therefore contributes to economic growth.

Chapter 4. A Multiple Choice Test

1.Net investment is:

a) non-production costs;

b) money spent by the population;

c) gross investments minus taxes;

d) gross investment minus depreciation.

2. All of the following changes will shift the investment demand curve to the right EXCEPT

a) a decrease in the corporate income tax rate

b) an increase in the productivity of new capital goods

c) an increase in the real interest rate

d) an increase in corporate profits

3.What causes the price of bonds to fluctuate?

a. growth rate
b. interest rate
c. inflation rate
d. exchange rate

4.In the short run, which of the following would occur to bond prices and interest rates if a central bank bought bonds through open-market operations?

Bond Prices Interest Rates

(A) No change Increase

(B) Increase Increase

(C) Increase Decrease

(D) Decrease Increase

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **Equilibrium level of output:** If the savings function is described by the formula **S = -30 + 0.1 Y**, and the autonomous investment is 125. What will the equilibrium level **Y** be?

2. **Equilibrium level of national income:** In the economy, the investment function is determined by the equation **I = 40 + 0.4 Y**, and the function of savings is demonstrated by the equation **S = -20 + 0.6 Y**, where **Y** is national income, and the investments equal savings. Determine the equilibrium level of national income.

3. **MPC:** Consumers save 0.1 money units out of every money unit of their income. Compute the marginal propensity to consume and the multiplier of autonomous investment.

4. **Savings function:** With the income being 180 money units, savings equal 20 money units. Suppose income decreases to 80 money units, savings drop to zero. Compute the savings function.

5. **Consumption function:** With the income being 200 money units, savings equal zero. Suppose income increases to 400 money units, savings increase by 40 money units. Income equals 500 money units. Compute the consumption function and the volume of investment.

6. **Consumption and savings:** The consumption function is C=100+0.8Y. Autonomous investment equals 50 money units. Compute the income, the volume of consumption and savings, and the multiplier of autonomous investment.

7. **Consumption function:** When investment increases from 2 to 4 million money units, the equilibrium income increases from 70 to 90 million money units. Compute the consumption function.

8. **Autonomous consumption:** When investment increases from 2 to 6 million money units, the equilibrium income increases from 120 to 140 million money units. Compute autonomous consumption (C0) and MPS (Sy).

9. **Equilibrium national income:** Investment (I) equals 10 million money units, autonomous consumption (C0) is 40 million money units, and MPS (Sy) is 0.4. Compute the equilibrium income (Y).

10. **Equilibrium national income:** When income (Y) equals 30 million money units, AD is 34 million money units. When income (Y) equals 60 million money units, AD is 58 million money units. Suppose autonomous consumption (C0) equals autonomous investment (I0). Compute the equilibrium income (Y).

CHAPTER 5. NET EXPORTS AS A COMPONENT OF AD

UNIT 5.1 The International Sector

Learning objectives

1. Discuss the main arguments economists make in support of free trade.
2. Explain the determinants of net exports and tell how each affects aggregate demand.

International Trade

International trade increases the quantity of goods and services available to the world's consumers. By allocating resources according to the principle of comparative advantage, trade allows nations to consume combinations of goods and services they would be unable to produce on their own, combinations that lie outside each country's production possibilities curve.

A country has a comparative advantage in the production of a good if it can produce that good at a lower opportunity cost than can other countries. If each country specializes in the production of goods in which it has a comparative advantage and trades those goods for things in which other countries have a comparative advantage, global production of all goods and services will be increased. The result can be higher levels of consumption for all.

If international trade allows expanded world production of goods and services, it follows that restrictions on trade will reduce world production. That, in a nutshell, is the economic case for free trade. It suggests that restrictions on trade, such as a tariff, a tax imposed on imported goods and services, or a quota, a ceiling on the quantity of specific goods and services that can be imported, reduce world living standards.

The global embrace of the idea of free trade demonstrates the triumph of economic ideas over powerful forces that oppose free trade. One source of opposition to free trade comes from the owners of factors of production used in industries in which a nation lacks a comparative advantage.

A related argument against free trade is that it not only reduces employment in some sectors but also reduces employment in the economy as a whole. In the long

run, this argument is clearly wrong. The economy's natural level of employment is determined by forces unrelated to trade policy, and employment moves to its natural level in the long run.

Further, trade has no effect on real wage levels for the economy as a whole. The equilibrium real wage depends on the economy's demand for and supply curve of labor. Trade affects neither.

In the short run, trade does affect aggregate demand. Net exports are one component of aggregate demand; a change in net exports shifts the aggregate demand curve and affects real GDP in the short run. All other things unchanged, a reduction in net exports reduces aggregate demand, and an increase in net exports increases it.

UNIT 5.2 Determinants of Net Exports

As trade has become more important worldwide, exports and imports have assumed increased importance in nearly every country on the planet. We have already discussed the increased shares of U.S. real GDP represented by exports and by imports. We will find in this section that the economy both influences, and is influenced by net exports. First, we will examine the determinants of net exports and then discuss the ways in which net exports affect aggregate demand.

Determinants of Net Exports

Net exports equal exports minus imports. Many of the same forces affect both exports and imports, albeit in different ways.

1. Income

As incomes in other nations rise, the people of those nations will be able to buy more goods and services—including foreign goods and services. Any one country's exports thus will increase as incomes rise in other countries and will fall as incomes drop in other countries.

A nation's own level of income affects its imports the same way it affects consumption. As consumers have more income, they will buy more goods and services. Because some of those goods and services are produced in other nations,

imports will rise. An increase in real GDP thus boosts imports; a reduction in real GDP reduces imports.

2. Relative Prices

A change in the price level within a nation simultaneously affects exports and imports. A higher price level in the United States, for example, makes U.S. exports more expensive for foreigners and thus tends to reduce exports. At the same time, a higher price level in the United States makes foreign goods and services relatively more attractive to U.S. buyers and thus increases imports. A higher price level therefore reduces net exports. A lower price level encourages exports and reduces imports, increasing net exports. As we saw in the chapter that introduced the aggregate demand and supply model, the negative relationship between net exports and the price level is called the international trade effect and is one reason for the negative slope of the aggregate demand curve.

3. The Exchange Rate

The purchase of U.S. goods and services by foreign buyers generally requires the purchase of dollars, because U.S. suppliers want to be paid in their own currency. Similarly, purchases of foreign goods and services by U.S. buyers generally require the purchase of foreign currencies, because foreign suppliers want to be paid in their own currencies. An increase in the exchange rate means foreigners must pay more for dollars, and must thus pay more for U.S. goods and services. It therefore reduces U.S. exports. At the same time, a higher exchange rate means that a dollar buys more foreign currency. That makes foreign goods and services cheaper for U.S. buyers, so imports are likely to rise. An increase in the exchange rate should thus tend to reduce net exports. A reduction in the exchange rate should increase net exports.

4. Trade Policies

A country's exports depend on its own trade policies as well as the trade policies of other countries. A country may be able to increase its exports by providing some form of government assistance (such as special tax considerations for companies that export goods and services, government promotional efforts, assistance with research, or subsidies). A country's exports are also affected by the degree to

which other countries restrict or encourage imports. The United States, for example, has sought changes in Japanese policies toward products such as U.S.-grown rice. Japan banned rice imports in the past, arguing it needed to protect its own producers. That has been a costly strategy; consumers in Japan typically pay as much as 10 times the price consumers in the United States pay for rice. Japan has given in to pressure from the United States and other nations to end its ban on foreign rice as part of the GATT accord. That will increase U.S. exports and lower rice prices in Japan.

Similarly, a country's imports are affected by its trade policies and by the policies of its trading partners. A country can limit its imports of some goods and services by imposing tariffs or quotas on them – it may even ban the importation of some items. If foreign governments subsidize the manufacture of a particular good, then domestic imports of the good might increase. For example, if the governments of countries trading with the United States were to subsidize the production of steel, then U.S. companies would find it cheaper to purchase steel from abroad than at home, increasing U.S. imports of steel.

5. Preferences and Technology

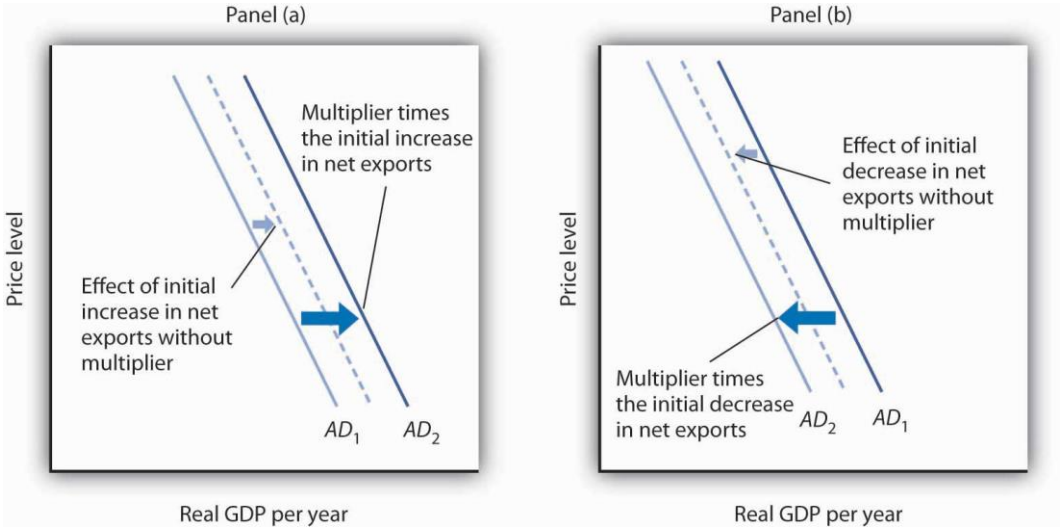
Consumer preferences are one determinant of the consumption of any good or service; a shift in preferences for a foreign-produced good will affect the level of imports of that good. The preference among the French for movies and music produced in the United States has boosted French imports of these services. Indeed, the shift in French preferences has been so strong that the government of France, claiming a threat to its cultural heritage, has restricted the showing of films produced in the United States. French radio stations are fined if more than 40% of the music they play is from 'foreign' (in most cases, U.S.) rock groups.

Changes in technology can affect the kinds of capital firms import. Technological changes have changed production worldwide toward the application of computers to manufacturing processes, for example. This has led to increased demand for high-tech capital equipment, a sector in which the United States has a comparative advantage and tends to dominate world production. This has boosted net exports in the United States.

6. Net Exports and Aggregate Demand

Net exports affect both the slope and the position of the aggregate demand curve. A change in the price level causes a change in net exports that moves the economy along its aggregate demand curve. This is the international trade effect. A change in net exports produced by one of the other determinants of net exports listed above (incomes and price levels in other nations, the exchange rate, trade policies, and preferences and technology) will shift the aggregate demand curve. The magnitude of this shift equals the change in net exports times the multiplier, as shown in Figure 5.1 *Changes in Net Exports and Aggregate Demand*. Panel (a) shows an increase in net exports; Panel (b) shows a reduction. In both cases, the aggregate demand curve shifts by the multiplier times the initial change in net exports, provided there is no other change in the other components of aggregate demand.

Figure 5.1 *Changes in Net Exports and Aggregate Demand*



Key concepts

- International trade allows the world's resources to be allocated on the basis of comparative advantage and thus allows the production of a larger quantity of goods and services than would be available without trade.
- Trade affects neither the economy's natural level of employment nor its real wage in the long run; those are determined by the demand for and the supply curve of labor.

- Growth in international trade has outpaced growth in world output over the past five decades.
- The chief determinants of net exports are domestic and foreign incomes, relative price levels, exchange rates, domestic and foreign trade policies, and preferences and technology.
- A change in the price level causes a change in net exports that moves the economy along its aggregate demand curve. This is the international trade effect. A change in net exports produced by one of the other determinants of net exports will shift the aggregate demand curve by an amount equal to the initial change in net exports times the multiplier.

CHAPTER 6. THE NATURE AND CREATION OF MONEY

UNIT 6.1 Functions and Types of Money

Learning objectives

1. Define money and discuss its three basic functions.
2. Distinguish between commodity money and fiat money, giving examples of each.
3. Define what is meant by the money supply and tell what is included in two definitions of it (M1 and M2)

Money is anything that serves as a medium of exchange. A medium of exchange is anything that is widely accepted as a means of payment. Money, ultimately, is defined by people and what they do. When people use something as a medium of exchange, it becomes money.

The Functions of Money

Money serves three basic functions. By definition, it is a medium of exchange. It also serves as a unit of account and as a store of value.

- **A Medium of Exchange**

The exchange of goods and services in markets is among the most universal activities of human life. To facilitate these exchanges, people settle on something that will serve as a medium of exchange – they select something to be money. Money is used as one part of almost every exchange. Workers exchange labour services for money. People buy or sell goods for money. People do not accept money to consume it directly but because it can subsequently be used to buy things they wish to consume.

We can understand the significance of a medium of exchange by considering its absence. **Barter** occurs when goods are exchanged directly for other goods. A **barter economy** is an economy that has no medium of exchange. Goods are swapped for other goods. To see the advantages of a medium of exchange, imagine a barter economy, i.e. an economy which has no medium of exchange. Goods are directly swapped for other goods. The seller and the buyer *each* must want something the other has to offer. Trading is very expensive in a barter economy. People spend a lot of time and effort finding others with whom they can make swaps. The use of money

makes trading simpler and more efficient. Nowadays, there are no purely barter economies, but economies nearer to or farther from the barter type. The closer is the economy to the barter type, the more wasteful it is.

- **A Unit of Account**

Money is the unit in which prices are quoted and accounts are kept. In the USA, for instance, prices are quoted in US dollars, in Japan, in yens. It is usually convenient to use the same unit for the medium of exchange and unit of account. However, there are exceptions. During the German hyperinflation of 1922-23 prices in German marks changed very quickly. German shopkeepers found it more convenient to use dollars as the unit of account. Prices were quoted in dollars but payment was made in marks. Similarly, Russia used the US dollar as a unit of account keeping rubles as means of payment in the 1990s when inflation rate was high. The higher is the inflation rate, the greater is the probability of introducing a temporary unit of account using the national currency as the medium of exchange.

Inflation is not the only reason of using two money units in the country. During 2000-2001 many European shopkeepers quoted prices in euros and in a local currency, even though the euro did not become their medium of exchange until 2002.

- **A Store of Value**

To be accepted in exchange, money has to store value. Nobody will accept money in payment for goods supplied today if the money is worthless when they try to buy goods with it later. But money is neither the only nor necessarily the best store of value. Because of inflation, there are better ways to store value. Houses, arts collections, and interest-bearing bank accounts all serve as stores of value. Money differs from these other stores of value by being readily exchangeable for other commodities. Its role as a medium of exchange makes it a convenient store of value.

Because money acts as a store of value, it can be used as a standard for future payments. When you borrow money, for example, you typically sign a contract pledging to make a series of future payments to settle the debt. These payments will be made using money because money acts as a store of value.

Types of Money

Although money can take an extraordinary variety of forms, there are really only two types of money: money that has intrinsic value and money that does not have intrinsic value.

Commodity money is money that has value apart from its use as money. Gold and silver are the most widely used forms of commodity money. Gold and silver can be used as jewelry and for some industrial and medicinal purposes, so they have value apart from their use as money. But something need not have intrinsic value to serve as money. **Fiat money** is money that some authority, generally a government, has ordered to be accepted as a medium of exchange. The currency – paper money and coins – used today is fiat money; it has no value other than its use as money.

Checkable deposits, which are balances in checking accounts, are other forms of money that have no intrinsic value. They can be converted to currency, but generally they are not; they simply serve as a medium of exchange. If you want to buy something, you can often pay with a **debit card**. Suppose, for example, that you have $100 in your checking account and you use your debit card and "charge" it $30. In this case, $30 will be transferred from your checking account to the bookstore's checking account. Notice that it is the checkable deposit, not the debit card, that is money.

Note! Credit cards are not money. A credit card identifies you as a person who has a special arrangement with the card issuer in which the issuer will lend you money and transfer the proceeds to another party whenever you want.

Measuring Money in the Economy

The total quantity of money in the economy at any one time is called the **money supply**. Economists measure the money supply because it affects economic activity. What should be included in the money supply? We want to include as part of the money supply those things that serve as media of exchange. However, the items that provide this function have varied over time.

Before 1980, the basic money supply was measured as the sum of currency in circulation, traveler's checks, and checkable deposits. Currency serves the medium-of-exchange function very nicely but denies people any interest earnings.

Over the last few decades, especially as a result of high interest rates and high inflation in the late 1970s, people sought and found ways of holding their financial assets in ways that earn interest and that can easily be converted to money. For example, it is now possible to transfer money from your savings account to your checking account using an automated teller machine (ATM) or the mobile banking facilities, and then to withdraw cash from your checking account. Thus, many types of savings accounts are easily converted into currency.

Economists refer to the ease with which an asset can be converted into currency as the asset's liquidity. In other words, **liquidity** describes the degree to which an asset can be quickly bought or sold in the market at a price reflecting its intrinsic value. Currency itself is perfectly liquid; you can always change two $5 bills for a $10 bill. Checkable deposits are almost perfectly liquid; you can easily get cash using an ATM. An office building, however, is highly illiquid. It can be converted to money only by selling it, a time-consuming and costly process.

As financial assets other than checkable deposits have become more liquid, economists have had to develop broader measures of money that would correspond to economic activity. Because it is difficult to determine what (and what not) to measure as money, central banks report several different measures of money, including M1 and M2.

Typically, **M1** is the narrowest of the money supply definitions. It includes currency in circulation, checkable deposits, and traveler's checks. **M2** is a broader measure of the money supply than M1. It includes M1 and other deposits such as small savings accounts (less than $100,000 in the USA).

M2 is sometimes called the broadly defined money supply, while M1 is the narrowly defined money supply. The assets in M1 may be regarded as perfectly liquid; the assets in M2 are highly liquid, but somewhat less liquid than the assets in M1. Even broader measures of the money supply include large time-deposits, money

market mutual funds held by institutions, and other assets that are somewhat less liquid than those in M2.

With all the operational definitions of money available, which one should we use? Economists generally answer that question by asking another: Which measure of money is most closely related to real GDP and the price level? As that changes, so must the definition of money. The choice of what to measure as money remains the subject of continuing research and considerable debate.

Key concepts

- **Money** is anything that serves as a medium of exchange. Other functions of money are to serve as a unit of account and as a store of value.
- Money may or may not have intrinsic value. **Commodity money** has intrinsic value because it has other uses besides being a medium of exchange. **Fiat money** serves only as a medium of exchange, because its use as such is authorized by the government; it has no intrinsic value.
- Central banks report several different **measures of money**, including **M1** and **M2**.
- **Liquidity** refers to the ease with which an asset, or security, can be converted into ready cash without affecting its market price. Cash is universally considered the most **liquid** asset because it can most quickly and easily be converted into other assets.

UNIT 6.2 Demand, Supply, and Equilibrium in the Money Market

Learning objectives

1. Explain the motives for holding money and relate them to the interest rate that could be earned from holding alternative financial assets, such as bonds.
2. Draw a money demand curve and explain how changes in other variables may lead to shifts in the money demand curve.
3. Illustrate and explain the notion of equilibrium in the money market.

4. Use graphs to explain how changes in money demand or money supply are related to changes in the bond market, in interest rates, in aggregate demand, and in real GDP and the price level.

The Demand for Money

In deciding how much money to hold, people make a choice about how to hold their wealth. How much wealth shall be held as money and how much as other assets? For a given amount of wealth, the answer to this question will depend on the relative costs and benefits of holding money versus other assets. The **demand for money** is the relationship between the quantity of money people want to hold and the factors that determine that quantity.

Three Main Motives for Holding Money

One reason people hold their assets as money is so that they can purchase goods and services. The money held for the purchase of goods and services may be for everyday transactions such as buying groceries or paying the rent, or it may be kept on hand for contingencies such as having the funds available to pay to have the car fixed or to pay for a trip to the doctor.

The **transactions demand for money** is money people hold to pay for goods and services they anticipate buying. The money people hold for contingencies represents their **precautionary demand for money**. Money held for precautionary purposes may include checking account balances kept for possible home repairs or health-care needs. People do not know precisely when the need for such expenditures will occur, but they can prepare for them by holding money so that they'll have it available when the need arises.

People also hold money for **speculative purposes**. Bond prices fluctuate constantly. As a result, holders of bonds not only earn interest but experience gains or losses in the value of their assets. Bondholders enjoy gains when bond prices rise and suffer losses when bond prices fall. Because of this, expectations play an important role as a determinant of the demand for bonds. Holding bonds is one alternative to holding money, so these same expectations can affect the demand for money.

Money is a specific good, and as any good it has a price. If the money you earn or have available is not enough to buy a car, you can "buy" more money by borrowing it in a bank. The cost of the money in the economy is called an interest rate. In general, the cost of money is the cost of lending and borrowing both by households and firms which is determined by the interest rates. The central bank's monopoly of the supply of cash allows it to control interest rates in the economy.

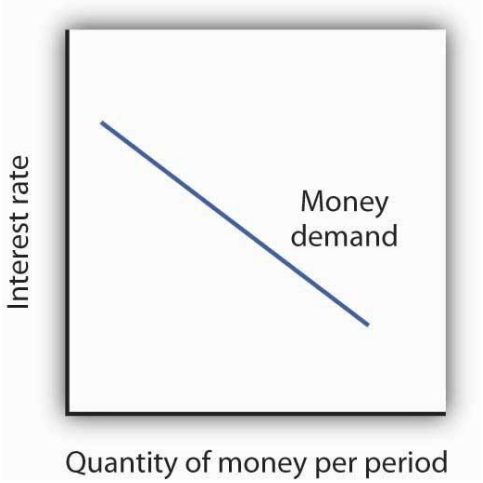
The demand for money is a demand for real money, i.e. nominal money deflated by the price level to undertake a given quantity of transactions. Hence, when the price level doubles, other things equal, the demand for nominal money balances doubles as well, leaving the demand for real money balances unaltered.

The Demand Curve for Money

The transactions, precautionary, and speculative demands for money vary negatively with the interest rate. Putting those three sources of demand together, we can draw a demand curve for money to show how the interest rate affects the total quantity of money people hold.

The demand curve for money shows the quantity of money demanded at each interest rate, all other things unchanged. Such a curve is shown in Figure 6.1 *The Demand Curve for Money*. An increase in the interest rate reduces the quantity of money demanded. A reduction in the interest rate increases the quantity of money demanded.

Figure 6.1 *The Demand Curve for Money*



The relationship between interest rates and the quantity of money demanded is an application of the law of demand. If we think of the alternative to holding money as holding bonds, then the interest rate – or the differential between the interest rate in the bond market and the interest paid on money deposits – represents the price of holding money. As is the case with all goods and services, an increase in price reduces the quantity demanded.

Other Determinants of the Demand for Money

We draw the demand curve for money to show the quantity of money people will hold at each interest rate, all other determinants of money demand unchanged. A change in those 'other determinants' will shift the demand for money. Among the most important variables that can shift the demand for money are the level of income and real GDP, the price level, expectations, and preferences.

1. Real GDP

A household with an income of $10,000 per month is likely to demand a larger quantity of money than a household with an income of $1,000 per month. That relationship suggests that money is a normal good: as income increases, people demand more money at each interest rate, and as income falls, they demand less.

An increase in real GDP increases incomes throughout the economy. The demand for money in the economy is therefore likely to be greater when real GDP is greater.

2. The Price Level

The higher the price level, the more money is required to purchase a given quantity of goods and services. All other things unchanged, the higher the price level, the greater the demand for money.

3. Expectations

The speculative demand for money is based on expectations about bond prices. All other things unchanged, if people expect bond prices to fall, they will increase their demand for money. If they expect bond prices to rise, they will reduce their demand for money.

The expectation that bond prices are about to change actually causes bond prices to change. If people expect bond prices to fall, for example, they will sell their

bonds, exchanging them for money. That will shift the supply curve for bonds to the right, thus lowering their price. The importance of expectations in moving markets can lead to a self-fulfilling prophecy.

Expectations about future price levels also affect the demand for money. The expectation of a higher price level means that people expect the money they are holding to fall in value. Given that expectation, they are likely to hold less of it in anticipation of a jump in prices.

Expectations about future price levels play a particularly important role during periods of hyperinflation. If prices rise very rapidly and people expect them to continue rising, people are likely to try to reduce the amount of money they hold, knowing that it will fall in value as it sits in their wallets or their bank accounts. Toward the end of the great German hyperinflation of the early 1920s, prices were doubling as often as three times a day. Under those circumstances, people tried not to hold money even for a few minutes—within the space of eight hours money would lose half its value!

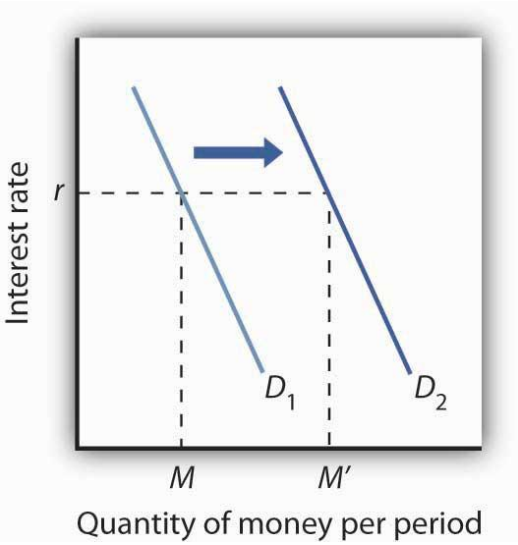
4. Preferences

Preferences also play a role in determining the demand for money. Some people place a high value on having a considerable amount of money on hand. For others, this may not be important.

Household attitudes toward risk are another aspect of preferences that affect money demand. As we have seen, bonds pay higher interest rates than money deposits, but holding bonds entails a risk that bond prices might fall. There is also a chance that the issuer of a bond will default, that is, will not pay the amount specified on the bond to bondholders; indeed, bond issuers may end up paying nothing at all. A money deposit, such as a savings deposit, might earn a lower yield, but it is a safe yield. People's attitudes about the trade-off between risk and yields affect the degree to which they hold their wealth as money.

Figure 6.2 *An Increase in Money Demand* shows an increase in the demand for money. Such an increase could result from a higher real GDP, a higher price level, a change in expectations, or a change in preferences.

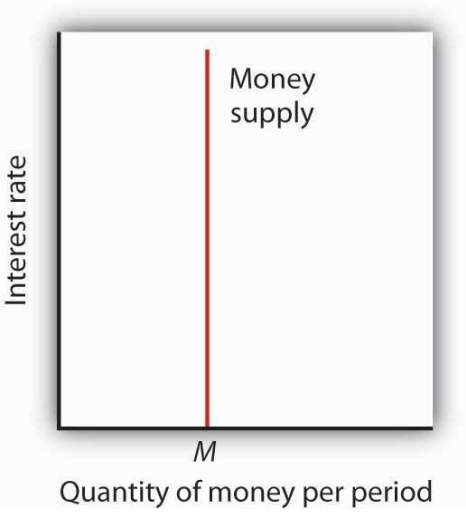
Figure 6.2 *An Increase in Money Demand*



The Supply of Money

The supply curve of money shows the relationship between the quantity of money supplied and the market interest rate, all other determinants of supply unchanged. Because the quantity of reserves is determined by the central bank, we draw the supply curve of money in Figure 6.3 *The Supply Curve of Money* as a vertical line, determined by the CB's monetary policies. In drawing the supply curve of money as a vertical line, we are assuming the money supply does not depend on the interest rate. Changing the quantity of reserves and hence the money supply is an example of monetary policy.

Figure 6.3 *The Supply Curve of Money*



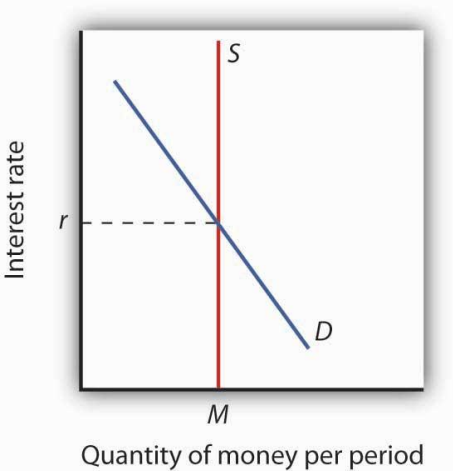
The supply of money is to a large extent determined by demand for money. If people start borrowing more money, the resulting shortage of money in the banks will

lead to an increase in interest rates. The banks will have an incentive to create extra credit to meet the demand for money at higher interest rate: money supply will expand. If banks find themselves short of liquidity, they can always borrow from the central bank.

Equilibrium in the Market for Money

The money market is the interaction among institutions through which money is supplied to individuals, firms, and other institutions that demand money. Money market equilibrium occurs at the interest rate at which the quantity of money demanded is equal to the quantity of money supplied. Figure 6.4 *Money Market Equilibrium* combines demand and supply curves for money to illustrate equilibrium in the market for money. With a stock of money (*M*), the equilibrium interest rate is ***r*.**

Figure 6.4 *Money Market Equilibrium*



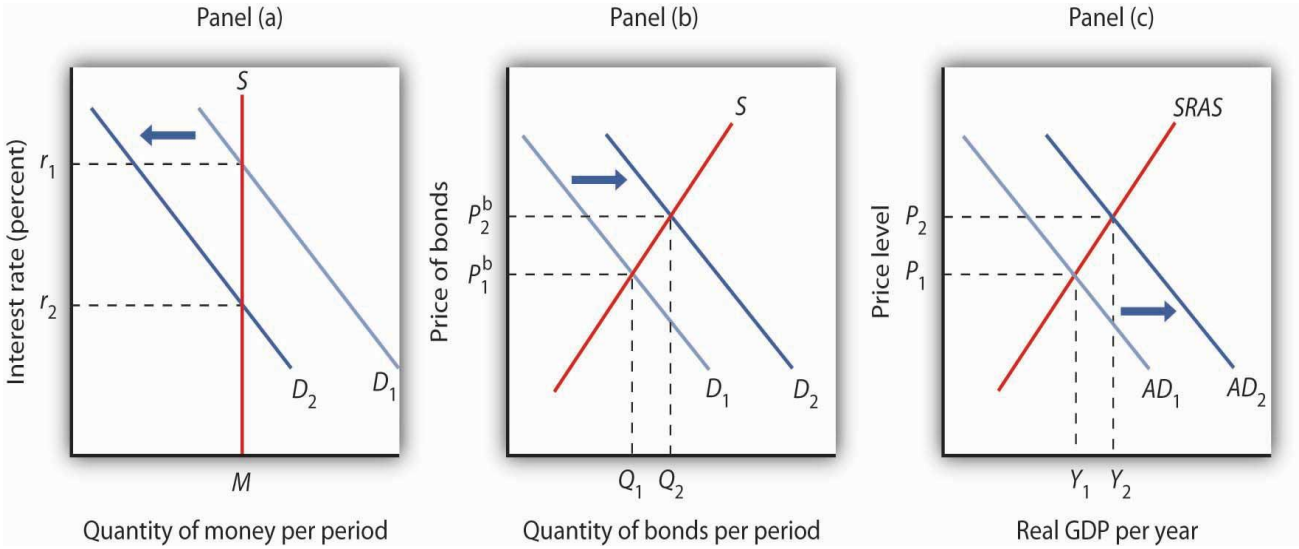
Changes in the Demand for Money

A shift in money demand or supply will lead to a change in the equilibrium interest rate. Let's look at the effects of such changes on the economy.

Suppose that the money market is initially in equilibrium at r_1 with supply curve *S* and a demand curve D_1 as shown in Panel (a) of Figure 6.5 *A Decrease in the Demand for Money*. Now suppose that there is a decrease in money demand, all other things unchanged. A decrease in money demand could result from a change in expectations or from a change in preferences. Panel (a) shows that the money demand curve shifts to the left to D_2. We can see that the interest rate will fall to r_2. To see

why the interest rate falls, we recall that if people want to hold less money, then they will want to hold more bonds. Thus, Panel (b) shows that the demand for bonds increases. The higher price of bonds means lower interest rates; lower interest rates restore equilibrium in the money market.

Figure 6.5 *A Decrease in the Demand for Money*



Lower interest rates in turn increase the quantity of investment. They also stimulate net exports, as lower interest rates lead to a lower exchange rate. The aggregate demand curve shifts to the right as shown in Panel (c) from AD_1 to AD_2. Given the short-run aggregate supply curve *SRAS*, the economy moves to a higher real GDP and a higher price level.

An increase in money demand which make people want to hold more money at each interest rate will have the opposite effect. The money demand curve will shift to the right and the demand for bonds will shift to the left. The resulting higher interest rate will lead to a lower quantity of investment. Thus, the AD curve will shift to the left. All other things unchanged, real GDP and the price level will fall.

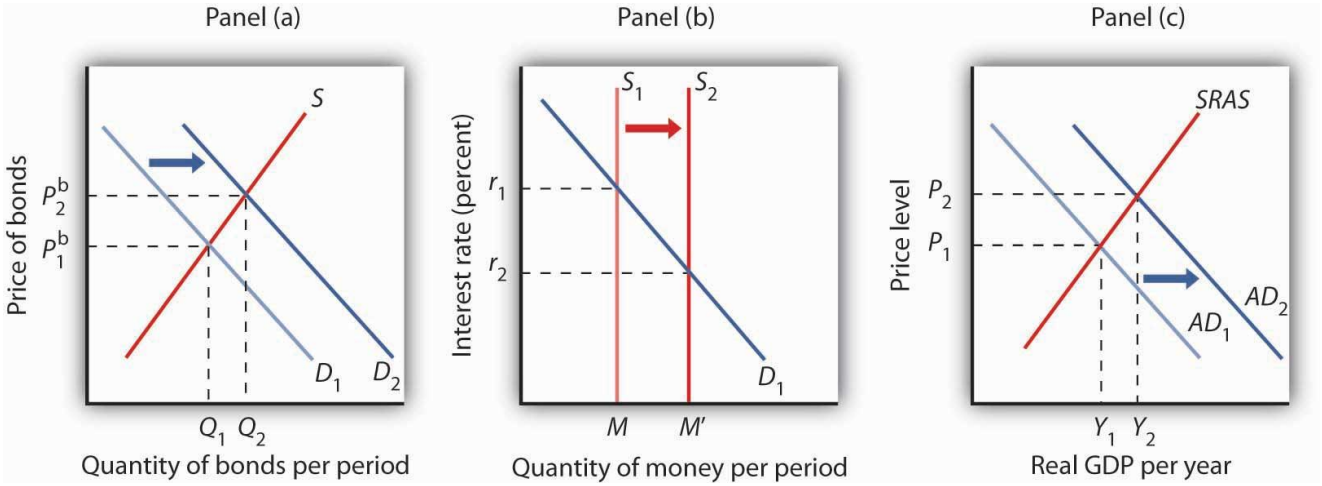
To sum up, a decrease in the demand for money, as shown in Panel (a), will be accompanied by an increase in the demand for bonds as shown in Panel (b), and a fall in the interest rate. The fall in the interest rate will cause a rightward shift in the AD curve from AD_1 to AD_2, as shown in Panel (c). As a result, real GDP and the price level rise.

Changes in Money Supply

Now suppose the market for money is in equilibrium and the central bank changes the money supply. All other things unchanged, how will this change in the money supply affect the equilibrium interest rate and aggregate demand, real GDP, and the price level?

Suppose the central bank conducts open-market operations in which it buys bonds. This is an example of expansionary monetary policy. The impact of central bank bond purchases is illustrated in Panel (a) of Figure 6.6 *An Increase in the Money Supply*. The central bank's purchase of bonds shifts the demand curve for bonds to the right, raising bond prices to *P*b2. As we learned, when the central bank buys bonds, the supply of money increases.

Figure 6.6 *An Increase in the Money Supply*



Panel (b) of Figure 6.6 *An Increase in the Money Supply* shows an economy with a money supply of *M*, which is in equilibrium at an interest rate of r_1. Now suppose the bond purchases by the central bank as shown in Panel (a) result in an increase in the money supply to *M′*; that policy change shifts the supply curve for money to the right to S_2. At the original interest rate r_1, people do not wish to hold the newly supplied money; they would prefer to hold non-money assets. To reestablish equilibrium in the money market, the interest rate must fall to increase the quantity of money demanded. In the economy shown, the interest rate must fall to r_2 to increase the quantity of money demanded to *M′*.

The reduction in interest rates required to restore equilibrium to the market for money after an increase in the money supply is achieved in the bond market. The increase in bond prices lowers interest rates, which will increase the quantity of money people demand. Lower interest rates will stimulate investment and net exports, via changes in the foreign exchange market, and cause the AD curve to shift to the right, as shown in Panel (c), from AD_1 to AD_2. Given the short-run AS curve *SRAS*, the economy moves to a higher real GDP and a higher price level.

Open-market operations in which the central bank sells bonds, that is, a contractionary monetary policy – will have the opposite effect. When the central bank sells bonds, the supply curve of bonds shifts to the right and the price of bonds falls. The bond sales lead to a reduction in the money supply, causing the money supply curve to shift to the left and raising the equilibrium interest rate. Higher interest rates lead to a shift in the AD curve to the left.

Key concepts

- People hold money in order to buy goods and services (transactions demand), to have it available for contingencies (precautionary demand), and in order to avoid possible drops in the value of other assets such as bonds (speculative demand).
- The higher the interest rate, the lower the quantities of money demanded for transactions, for precautionary, and for speculative purposes. The lower the interest rate, the higher the quantities of money demanded for these purposes.
- The demand for money will change as a result of a change in real GDP, the price level, expectations, or preferences.
- We assume that the supply of money is determined by the central banks. The supply curve for money is thus a vertical line. Money market equilibrium occurs at the interest rate at which the quantity of money demanded equals the quantity of money supplied.
- All other things unchanged, a shift in money demand or supply will lead to a change in the equilibrium interest rate and therefore to changes in the level of real GDP and the price level.

UNIT 6.3 The Banking System

Learning objectives

1. Explain what banks are, what their balance sheets look like, and what is meant by a reserve banking system.
2. Describe the process of money creation (destruction), using the concept of the deposit multiplier.
3. Describe how and why banks are regulated and insured.
4. Explain the primary functions of central banks.

Banks and Other Financial Intermediaries

An institution that amasses funds from one group and makes them available to another is called a **financial intermediary**. Commercial banks play a particularly important role as financial intermediaries. Banks accept depositors' money and lend it to borrowers. With the interest they earn on their loans, banks are able to pay interest to their depositors, cover their own operating costs, and earn a profit, all the while maintaining the ability of the original depositors to spend the funds when they desire to do so. One key characteristic of banks is that they offer their customers the opportunity to open checking accounts, thus creating checkable deposits. These functions define a **bank**, which is a financial intermediary that accepts deposits, makes loans, and offers checking accounts.

Other financial intermediaries include pension funds. Workers and firms place earnings in the fund for their retirement; the fund earns income by lending money to firms or by purchasing their stock. The fund thus makes retirement saving available for other spending. Insurance companies are also financial intermediaries, because they lend some of the premiums paid by their customers to firms for investment. Mutual funds make money available to firms and other institutions by purchasing their initial offerings of stocks or bonds.

In addition to commercial banks, most countries have a central bank which is the main bank in the banking system. The Federal Reserve System of the United

States, or Fed, is the U.S. central bank. Japan's central bank is the Bank of Japan; the European Union has established the European Central Bank.

For the first 137 years of its history, the United States did not have a true central bank. While a central bank was often proposed, there was resistance to creating an institution with such enormous power. A series of bank panics slowly increased support for the creation of a central bank. The bank panic of 1907 proved to be the final straw. Bank failures were so widespread, and depositor losses so heavy, that concerns about centralization of power gave way to a desire for an institution that would provide a stabilizing force in the banking industry. Congress passed the Federal Reserve Act in 1913, creating the Fed and giving it all the powers of a central bank.

The Functions of Central Banks

Central banks implement four major functions in the economy: commercial banking supervision; financial stability preservation by being the lender of last resort, exchange rate supervision; monetary policy implementation.

The first function is **commercial banking supervision** involving regulation of the banking system. The purpose is to make sure that the commercial banks have enough liquidity and are solvent. Another reason for the high degree of regulation is that variations in the quantity of money have important effects on the economy as a whole, and banks are the institutions through which money is created. If banks have enough liquidity, they avoid a bank run, or bank failure. In this way, central banks try to support the stability of the financial system in the economy. Central banks do this by setting reserve requirements.

The Central Banks have the power to close a bank whose net worth has fallen below the required level. In practice, it typically acts to close a bank when it becomes insolvent, that is, when its net worth becomes negative. Negative net worth implies that the bank's liabilities exceed its assets.

From a customer's point of view, the most important form of regulation comes in the form of deposit insurance. For commercial banks, this insurance is provided by the Central Bank. If a commercial bank fails, the Fed guarantees to reimburse

depositors up to at least $100,000 per account. From a depositor's point of view, therefore, it is not necessary to worry about a bank's safety.

The second main task of a central bank is to preserving the **financial stability** by acting as a lender of last resort. In case one of the commercial banks has problems with liquidity and the people who put money in the bank need to get their money back. It is a case when the central bank will be the only lender to the bank facing problems. This eliminates a possible panic in the financial sector, which may destabilize the whole economy.

The third function is **exchange rate supervision**. In other words, intervention on foreign exchange markets: buying or selling large amounts of the national currency to influence its exchange rate by increasing or decreasing the supply of national currency in the FOREX market.

Finally, central banks **implement monetary policy**. There are three ways to do it:

a) to print money: coins, banknotes thus controlling the amount of banknotes in circulation.
b) to set discount interest rates or minimum rates to control the credit system. A country's minimum or discount interest rate is the rate at which the central bank makes loans to commercial banks. Banks lend to very large companies at the base rate, or the prime rate; all other borrowers pay more. Lowering the discount rate makes funds cheaper to banks. A lower discount rate could place downward pressure on interest rates in the economy.
c) to use open-market operations. Open market operations are the sale or purchase of government securities, such as bonds, in the open market in order to reduce or increase money supply. Open market operations are used mainly in the countries that have highly developed financial markets.

When the regulator closes a bank, it arranges for depositors to receive their funds. When the bank's funds are insufficient to return customers' deposits, the regulator uses money from the insurance fund for this purpose. Alternatively, the regulator may arrange for another bank to purchase the failed bank. The regulator, however, continues to guarantee that depositors will not lose any money.

A Bank Balance Sheet

Bank finance lies at the heart of the process through which money is created. To understand money creation, we need to understand some of the basics of bank finance.

Banks accept deposits and issue checks to the owners of those deposits. Banks use the money collected from depositors to make loans. The bank's financial picture at a given time can be depicted using a simplified balance sheet (Table 6.1), which is a financial statement showing assets, liabilities, and net worth. **Assets** are anything of value. **Liabilities** are obligations to other parties. **Net worth** equals assets less liabilities. All these are given dollar values in a firm's balance sheet. The sum of liabilities plus net worth therefore must equal the sum of all assets. On a balance sheet, assets are listed on the left, liabilities and net worth on the right.

Table 6.1 *A Simplified Balance Sheet*

Assets in millions of $		**Liabilities and Net Worth** in millions of $	
Reserves	300.0	Checkable deposits	604.5
Other assets	1,357.8	Other deposits	6,306.7
Loans	6,903.4	Borrowings	2,322.1
Securities	2,466.9	Other liabilities	6,576.6
Total assets	$11,928.1	**Total liabilities**	9,890.9
		Net worth	1,137.2

The main way that banks earn profits is through issuing loans. Because their depositors do not typically all ask for the entire amount of their deposits back at the same time, banks lend out most of the deposits they have collected – to companies seeking to expand their operations, to people buying cars or homes, and so on. Banks keep only a fraction of their deposits as cash in their vaults and in deposits with the Central Bank. These assets are called **reserves**.

Table 6.1 *The Balance Sheet* shows a balance sheet for a commercial bank. Banks hold reserves against the liabilities represented by their checkable deposits. Most bank assets are in the form of loans.

UNIT 6.4 Money Creation and a Deposit Multiplier

To understand the process of money creation today, let us create a hypothetical system of banks. We will focus on three banks in this system: Bank A, Bank B, and Bank C. Assume that all banks are required to hold reserves equal to 10% of their checkable deposits. The quantity of reserves banks are required to hold is called **required reserves**. The reserve requirement is expressed as a **required reserve ratio**; it specifies the ratio of reserves to checkable deposits a bank must maintain; in our example **rrr** equals 10%. Banks may hold reserves in excess of the required level; such reserves are called **excess reserves**. Excess reserves plus required reserves equal **total reserves**.

Because banks earn relatively little interest on their reserves held on deposit with the central bank, we shall assume that they seek to hold no excess reserves. When a bank's excess reserves equal zero, it is **loaned up**. Finally, we shall ignore assets other than reserves and loans and deposits other than checkable deposits. To simplify the analysis further, we shall suppose that banks have no net worth; their assets are equal to their liabilities.

Let us suppose that every bank in our imaginary system begins with $1,000 in reserves, $9,000 in loans outstanding, and $10,000 in checkable deposit balances held by customers. The balance sheet for one of these banks, Bank A, is shown in Table 6.2 *A Balance Sheet for Bank A.*

Table 6.2 *A Balance Sheet for Bank A*

Assets		**Liabilities**	
Reserves	$1,000	Deposits	$10,000
Loans	$9,000		

Now suppose one of Bank A's customers deposits $1,000 in cash in a checking account. As we can see in Table 6.3 *Bank A, Changes in Balance Sheet* the money adds to the bank's reserves. The customer now has an additional $1,000 in his or her account. Reserves now equal $2,000 and checkable deposits equal $11,000. With checkable deposits of $11,000 and a 10% reserve requirement, Bank A is required to hold reserves of $1,100. With reserves equaling $2,000, Bank A has $900 in excess reserves.

At this stage, there has been no change in the money supply. When the customer brought in the $1,000 and Bank A put the money in the vault, currency in circulation fell by $1,000. At the same time, the $1,000 was added to the customer's checking account balance, so the money supply did not change.

Table 6.3 *Bank A, Changes in Balance Sheet*

Assets	Liabilities
Reserves +$2,000 Loans $9,000	Deposits +$11,000
Excess reserves **$900**	

Suppose Bank A lends the excess reserves of $900 to one of its customers. Presumably, the customer who borrowed the $900 did so in order to spend it. He uses his debit card to pay to a firm with an account at Bank B. In this set of transactions, Bank A's checkable deposits fall by $900. The firm that receives the payment deposits it in its account at Bank B, increasing that bank's checkable deposits by $900.

The $900 in new money Bank A created when it issued a loan has not vanished – it is now in an account in Bank B. Banks create money when they issue loans, but no one bank ever seems to keep the money it creates. That is because money is created within the banking system, not by a single bank.

The $900 deposit required an increase in required reserves of $90 and has $810 in excess reserves. Just as Bank A lent the amount of its excess reserves, we can expect Bank B to lend this $810. Let us suppose it ends up with a customer who

banks at Bank C. Bank B's checkable deposits fall by $810; Bank C's rise by the same amount. Bank C must increase its reserves by $81 and it has excess reserves of $729.

The process will not end there. Bank C will lend the $729 it now has in excess reserves, and the money that has been created will end up at some other bank, which will then have excess reserves – and create still more money. And that process will just keep going as long as there are excess reserves to pass through the banking system in the form of loans.

How much will ultimately be created by the system as a whole? With a 10% reserve requirement, each dollar in reserves backs up $10 in checkable deposits. The $1,000 in cash that Bank A's customer brought in adds $1,000 in reserves to the banking system. It can therefore back up an additional $10,000! In just the three banks we have shown, checkable deposits have risen by $2,710 ($1,000 at Bank A, $900 at Bank B, and $810 at Bank C). Additional banks in the system will continue to create money, up to a maximum of $7,290 among them. Subtracting the original $1,000 that had been a part of currency in circulation, we see that the money supply could rise by as much as $9,000.

Note! Notice that when the banks received new deposits, they could make new loans only up to the amount of their excess reserves, not up to the amount of their deposits and total reserve increases.

The Deposit Multiplier

We can relate the potential increase in the money supply to the change in reserves that created it using the deposit multiplier (*m*d), which equals the ratio of the maximum possible change in checkable deposits (ΔD) to the change in reserves (ΔR):

$$\mathbf{m}d = \Delta\mathbf{D} / \Delta\mathbf{R}$$

In our example, the deposit multiplier is 10: $10,000/ $1,000

To see how the deposit multiplier ***m*d** is related to the required reserve ratio, we use the fact that if banks in the economy are loaned up, then reserves (***R)*** equal the required reserve ratio (***rrr***) times checkable deposits (***D)***: **R = rrr D**

A change in reserves produces a change in loans and a change in checkable deposits. Once banks are fully loaned up, the change in reserves **(**$\Delta \boldsymbol{R}$**)** will equal the required reserve ratio times the change in deposits **(**$\Delta \boldsymbol{D}$**)**: $\Delta \mathbf{R} = \mathbf{rrr}\ \Delta \mathbf{D}$

Solving for ΔD, we have the equation: $\frac{\mathbf{1}}{\boldsymbol{rrr}} \Delta \boldsymbol{R} = \Delta \boldsymbol{D}$**.**

Dividing both sides by ΔR, we see that the deposit multiplier. The deposit multiplier is thus given by the reciprocal of the required reserve ratio: $\boldsymbol{md} = \mathbf{1}/\boldsymbol{rrr}$

With a required reserve ratio of 0.1, the deposit multiplier is 10. A required reserve ratio of 0.2 would produce a deposit multiplier of 5. The higher the required reserve ratio, the lower the deposit multiplier.

An increase or decrease in reserves (R) in the banking system can increase/ decrease money supply (MS). A change in MS equals a change in reserves times a deposit multiplier $\boldsymbol{m_d}$:

$$\Delta \text{MS} = \Delta R\ m_d$$

As $m_d = 1/\text{rrr}$, $\Delta \text{M} = \Delta R\ /\ rrr$

Similar to the process of money creation, the **money reduction** process decreases checkable deposits by, at most, the amount of the reduction in deposits times the deposit multiplier.

Key concepts

- Banks are **financial intermediaries** that accept deposits, make loans, and provide checking accounts for their customers.
- Bank deposits are insured and banks are heavily regulated.
- **Central banks** act as a bank for other banks and for the government. It also regulates banks, maintains the stability of the financial system, and sets monetary policy.
- The central bank sets reserve requirements and the discount rate and conducts open-market operations. Of these tools of monetary policy, open-market operations are the most important.
- Money is created within the banking system when banks issue loans; it is destroyed when the loans are repaid.

- An increase (decrease) in reserves in the banking system can increase (decrease) the money supply. The maximum amount of the increase (decrease) is equal to the deposit multiplier times the change in reserves; the deposit multiplier equals the reciprocal of the required reserve ratio.

Chapter 6. A Multiple Choice Test

1. The money supply is shown on the graph as:

a) a horizontal line;

b) a dashed line;

c) a curve with a negative slope;

d) a vertical line.

2. The term ‘discount rate’ means:

a) the level of price reduction for the Central Bank when it buys government securities;

b) the percentage at which the Central Bank provides loans to commercial banks;

c) the degree of pressure exerted by the Central Bank on commercial banks to reduce the volume of loans issued by them;

d) the impact of the Central Bank on the growth of money supply and GNP.

3. Which of the Central Bank operations increases the amount of money in circulation?

a) the Central Bank increases the mandatory reserve ratio;

b) the Central Bank transfers government bonds to the population and banks;

c) the Central Bank raises the interest rate at which it lends to banks;

d) the Central Bank buys government bonds on the open market.

4. The velocity of money circulation is equal to:

a) the amount of bank loans issued divided by their number of borrowers;

b) price index adjusted for real gross domestic product;

c) the average number of payments in which each monetary unit participates during a year;

d) the average number of transfers of non-cash money per year per commercial bank.

5. The transaction demand for money is very closely associated with money's use as
   a) store of value
   b) standard unit of account
   c) measure of value
   d) medium of exchange

6. The amount of money that the public wants to hold in the form of cash will
   a) be unaffected by any change in interest rates or the price level
   b) increase if interest rates increase
   c) decrease if interest rates increase
   d) increase if the price level decreases

7. Which of the following will lead to a decrease in a nation's money supply?
   a) A decrease in income tax rates
   b) A decrease in the discount rate
   c) An open market purchase of government securities by the central bank
   d) An increase in reserve requirements
   e) An increase in government expenditures on goods and services

8. A commercial bank's ability to create money depends on which of the following?
   a) The existence of a central bank
   b) A reserve banking system
   c) Gold or silver reserves backing up the currency
   d) A large national debt
   e) The existence of both checking accounts and savings accounts

9. In the short run, which of the following would occur to bond prices and interest rates if a central bank bought bonds through open-market operations?

	Bond Prices	Interest Rates
a)	No change	Increase
b)	Increase	Increase
c)	Increase	Decrease

d) Decrease Increase

e) Decrease Decrease

10. In the narrowest definition of money, M1, savings accounts are excluded because they are

a) interest-paying accounts

b) not insured by federal deposit insurance

c) available from financial institutions other than banks

d) a store of purchasing power

e) not a medium of exchange

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **Demand for money:** The nominal GDP is 5,000 money units, one monetary unit makes an average of 2.5 turns per year, and the speculative demand for money is 400 money units. What is the total demand for money?

2. **Money in circulation:** The real volume of production is worth 28 million units, and the rate of circulation of a monetary unit is 7. What will the real money value in the economy?

3. **Money supply and rrr:** What will be the total increase in the money supply in the country, if the required reserve ratio is 10% and the initial increase in deposits amounted to $ 200 million?

4. **Change in money supply:** Bank deposits increased by 200 million rubles, and the required reserve ratio is 20%. What is the potential increase in money supply?

5. **Money multiplier:** The required reserves ratio in the country equals 25%. What is the money multiplier?

6. **Change in Deposits and in Money Supply:** Assume that the required reserve ratio is 10%, the banks keep no excess reserves, and borrowers deposit all loans made by banks. Suppose you have saved $100 in cash at home and decide to deposit it in your checking account. How much can the money supply increase as a result of your deposit?

7. Velocity: The country's GDP equals $4,000bn and the transactional demand for money is $800bn. What is the money velocity?

8. **Money in circulation:** The CB of Russia printed additional 500 million rubles. What will an increase in quantity of money supply (money in circulation) be in Russia if the money multiplier is 5?

9. **Money Supply:** The CB buys back government bonds of 5m money units. If rrr equals 20%, what can the maximum increase in money supply be?

10. **Bank deposits and loans:** Suppose a bank initially has $10,000 in deposits, reserves of $2,000, and loans of $8,000. Answer the questions and do the tasks.

1) At a required reserve ratio of 0.2, is the bank loaned up?
2) Draw the bank's balance sheet at present (Assets and Liabilities).
3) Suppose that the bank customer, planning to take cash on an extended college graduation trip to Germany, withdraws $1,000 from her account. Write the balance sheet after the withdrawal. What will the bank's balance sheet look like after losing $1,000 in deposits? Draw a new balance sheet. By how much are its reserves (R) now deficient?

CHAPTER 7. MACROECONOMIC INSTABILITY

UNIT 7.1 Business Cycles

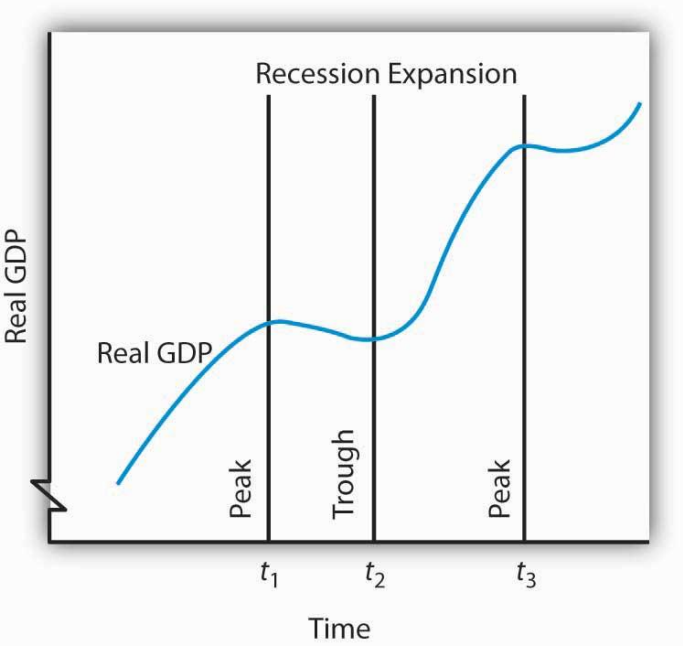
Learning objectives

1. Identify the phases of a business cycle.
2. Relate business cycles to the overall long-run trend in real GDP.

Phases of the Business Cycle

The business cycle or trade cycle is a permanent feature of market economies: gross domestic product (GDP) fluctuates as booms and recessions succeed each other. Figure 7.1 *Phases of the Business Cycle* shows a simplified picture of a typical business cycle. It shows that economies go through periods of increasing and decreasing real GDP, but that over time they generally move in the direction of increasing levels of real GDP. A sustained period in which real GDP is rising is an expansion; a sustained period in which real GDP is falling is a recession.

Figure 7.1 *Phases of the Business Cycle*



The cycle begins at a peak and continues through a recession, a trough, and an expansion. A new cycle begins at the next peak. Here, the first peak occurs at time t_1, the trough at time t_2, and the next peak at time t_3. Notice that there is a tendency for real GDP to rise over time.

At time t_1 an expansion ends and real GDP turns downward. The point at which an expansion ends and a recession begins is called the peak of the business cycle. Real GDP then falls during a period of recession. Eventually it starts upward again (at time t_2). The point at which a recession ends and an expansion begins is called the trough of the **business cycle**. The expansion continues until another peak is reached at time t_3.

During a boom, an economy (or at least parts of it) expands to the point where it is working at full capacity, so that production, employment, prices, profits, investment and interest rates all tend to rise. During a recession, the demand for goods and services declines and the economy begins to work at below its potential. Investment, output, employment, profits, commodity and share prices, and interest rates generally fall. A serious, long-lasting recession is called a depression. Not all recessions lead to a depression – there might just be a mild slowdown in the economy (seen as a reduction in GDP).

Theories explaining business cycles

There are various theories explaining the causes of the business cycle. Internal (or endogenous) theories consider it to be self-generating, regular, and indefinitely repeating. A peak is reached when (or just before) people begin to consume less, for whatever reason. As far back as the mid-nineteenth century, it was suggested that the business cycle results from people infecting one another with optimistic or pessimistic expectations. When economic times are good or when people feel good about the future, they spend, and run up debts. If interest rates rise too high, a lot of people find themselves paying more than they anticipated on their mortgage or rent, and so have to consume less. If people are worried about the possibility of losing their jobs in the near future, they tend to save more. A country's output, investment, unemployment, and so on, all depend on millions of decisions by consumers and industrialists on whether to spend, borrow or save.

Investment is closely linked to consumption, and only takes place when demand and output are growing. Consequently, as soon as demand stops growing at the same rate, even at a very high level, investment will drop, probably leading to a

downturn. Another theory is that sooner or later during every period of economic growth – when demand is strong, and prices can easily be put up, and profits are increasing – employees will begin to demand higher wages and salaries. As a result, employers will either reduce investment, or start to lay off workers, and downswing will begin.

External (or exogenous) theories, on the contrary, look for causes outside economic activity: scientific advances, natural disasters, elections or political shocks, demographic changes, and so on. Joseph Schumpeter believed that the business cycle is caused by major technological inventions (the steam engine, railways, automobiles, electricity, microchips, and so on), which lead to periods of 'creative destruction'. He suggested that there was 56-year Kondratieff cycle, named after a Russian economist. A simpler theory is that, where there is no independent central bank, the business cycle is caused by the fact that governments begin their periods of office with a couple of years of austerity programmes involving government spending cuts and/or a rise in taxes due to a problem with the budget deficit, which is followed by tax cuts and monetary expansion in the two years before the next election. This phenomenon is known as a political business cycle which interferes with the trade cycle making it sometimes worse.

Key concepts

1. The economy follows a path of expansion, then contraction, then expansion again. These fluctuations make up the **business cycle**.
2. The point at which an expansion becomes a recession is called the peak of a business cycle; the point at which a recession becomes an expansion is called the trough.
3. There is a number of theories which attempt to explain a business cycle.
4. Over time, the general trend for most economies is one of rising real GDP.

UNIT 7.2 Economic Growth

Learning objectives

1. Define economic growth and explain it using the production possibilities model and the concept of potential output.
2. Calculate the percentage rate of growth of output per capita.

Defining Economic Growth

Real GDP is widely used to measure economic growth rates. Governments closely follow changes in the numbers of real GDP over a 12-month period. A percentage change in real GDP in one year compared with the real GDP in the previous year gives an idea whether the economy is growing or shrinking. So an annual economic growth rate equals the difference between the real GDP in year 2 and year 1 divided by the real GDP in year 1.

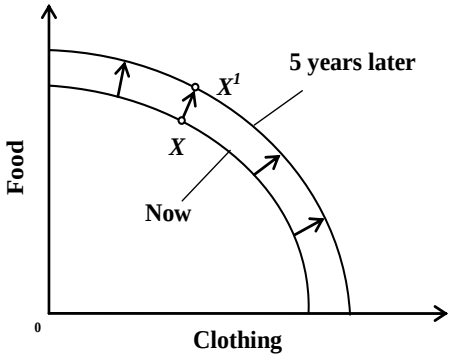
Economic growth = $\frac{Yt-Y(t-1)}{Y(t-1)} * 100\%$, where Yt is real GDP of the current year; Y(t-1) is real GDP of the previous year. It can be a positive or a negative number.

But this measure does not take into account possible cyclical implications. It is more desirable to analyze rate of economic growth over a long term, actually, comparing the years in which the economy was working at its potential output level with full employment. In other words, economic growth is a long-run process that occurs as an economy's potential output increases. Changes in real GDP from quarter to quarter or even from year to year are short-run fluctuations that occur as aggregate demand and short-run aggregate supply change. Regardless of media reports stating that the economy grew at a certain rate in the last quarter or that it is expected to grow at a particular rate during the next year, short-run changes in real GDP say little about economic growth. In the long run, the economic activity moves toward its level of potential output.

Economic growth is the process through which an economy achieves an outward shift in its production possibilities curve (Figure 7.2) which is used to

illustrate the variations in the amounts that can be produced of two products now and later if the country is experiencing an economic growth.

Figure 7.2 *Production Possibilities Curve*



How does a shift in the production possibilities curve relate to a change in potential output?

To produce its potential level of output, an economy must operate on its production possibilities curve. An increase in potential output thus implies an outward shift in the production possibilities curve. In the framework of the macroeconomic model of aggregate demand and aggregate supply, we show economic growth as a shift to the right in the vertical *LRAS* curve.

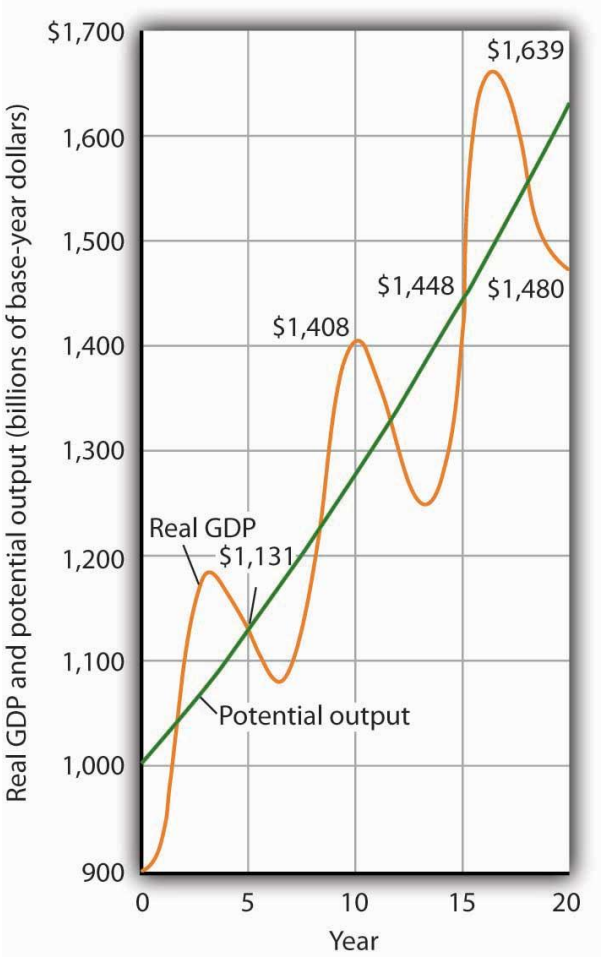
There are three key points about economic growth to keep in mind:

1. Growth is a process. It is not a single event; rather, it is an unfolding series of events.
2. We define growth in terms of the economy's ability to produce goods and services, as indicated by its level of potential output.
3. Growth suggests that the economy's ability to produce goods and services is rising.

The use of actual values of real GDP to measure growth can give misleading results. Let us analyze Figure 7.3 *Cyclical Change Versus Growth.* Here, an economy's potential output grows at a steady rate of 2.8% per year, with actual values of real GDP fluctuating about that trend. If we measure growth in the first 10 years as the annual rate of change between beginning and ending values of real GDP, we get a growth rate of 3.5%. The rate for the second decade is 0.5%. Growth

estimates based on changes in real GDP are affected by cyclical changes that do not represent economic growth.

Figure 7.3 *Cyclical Change Versus Growth*



By measuring economic growth as the rate of increase in potential output, we avoid such problems. One way to do this is to select years in which the economy was operating at the natural level of employment and then to compute the annual rate of change between those years. The result is an estimate of the rate at which potential output increased over the period in question. For the economy shown in Figure 7.3 *Cyclical Change Versus Growth*, for example, we see that real GDP equaled its potential in years 5 and 15. Real GDP in year 5 was $1,131, and real GDP in year 15 was $1,448. The annual rate of change between these two years was 2.8%. If we have estimates of potential output, of course, we can simply compute annual rates of change between any two years.

Growth in Output per Capita

Of course, it is not just how fast potential output grows that determines how fast the average person's material standard of living rises. For that purpose, we examine economic growth on a per capita basis.

An economy's output per capita equals real GDP per person. If we let *N* equal population, then we get the following equation:

$$\text{Output per capita} = \text{real GDP} / N$$

We use output per capita as a gauge of an economy's material standard of living. If the economy's population is growing, then output must rise as rapidly as the population if output per capita is to remain unchanged. If, for example, population increases by 2%, then real GDP would have to rise by 2% to maintain the current level of output per capita. If real GDP rises by less than 2%, output per capita will fall. If real GDP rises by more than 2%, output per capita will rise. More generally, we can write an equation:

$$\%\text{ rate of growth of output per capita} = \%\text{ rate of growth of output} - \%\text{ rate of growth of population}$$

For economic growth to translate into a higher standard of living on average, economic growth must exceed population growth.

GDP per capita is used to analyze a country's wealth and prosperity based on its economic growth. Small, rich countries and more developed industrial countries tend to have the highest per capita GDP. The U.S. is one of the world's largest countries by population but still manages to rank high in per capita GDP. China has the world's second-largest GDP ($15,270 billion) with the world's largest population (1.4 billion) leading to a low per capita GDP ranking ($10,870).

Key concepts

- Economic growth is the process through which an economy's production possibilities curve shifts outward. We measure it as the rate at which the economy's potential level of output increases.
- Measuring economic growth as the rate of increase of the actual level of real GDP can lead to misleading results due to the business cycle.

- Small differences in rates of economic growth can lead to large differences in levels of potential output over long periods of time.
- To assess changes in average standards of living, we subtract the percentage rate of growth of population from the percentage rate of growth of output to get the percentage rate of growth of output per capita.

UNIT 7.3 Inflation and Deflation. Consumer Price Index

Learning objectives

1. Define inflation and deflation.
2. Explain how their rates are determined.
3. Explain what a price index is and outline the general steps in computing a price index.

Inflation is an increase in the average level of prices, and **deflation** is a decrease in the average level of prices. In an economy experiencing inflation, most prices are likely to be rising, whereas in an economy experiencing deflation, most prices are likely to be falling.

There are two key points in these definitions:

1. Inflation and deflation refer to changes in the average level of prices, not to changes in particular prices. An increase in medical costs is not inflation. A decrease in gasoline prices is not deflation. Inflation means the average level of prices is rising, and deflation means the average level of prices is falling.

2. Inflation and deflation refer to *rising* prices and *falling* prices, respectively; therefore, they do not have anything to do with the *level* of prices at any one time. "High" prices do not imply the presence of inflation, nor do "low" prices imply deflation. Inflation means a positive *rate of change* in average prices, and deflation means a negative *rate of change* in average prices.

What difference does it make if the average level of prices changes? First, consider the impact of inflation. Whether one regards inflation as a "good" thing or a "bad" thing depends very much on one's economic situation. If you are a borrower, unexpected inflation is a good thing—it reduces the value of money that you must

repay. If you are a lender, it is a bad thing because it reduces the value of future payments you will receive. Whatever any particular person's situation may be, inflation always produces the following effects on the economy: it reduces the value of money and it reduces the value of future monetary obligations. It can also create uncertainty about the future.

Suppose that you have just found a $10 bill you stashed away in 1990. Prices have increased by about 50% since then; your money will buy less than what it would have purchased when you put it away. Your money has thus lost value.

Money loses value when its purchasing power falls. Since inflation is a rise in the level of prices, the amount of goods and services a given amount of money can buy falls with inflation.

Just as inflation reduces the value of money, it reduces the value of future claims on money. Suppose you have borrowed $100 from a friend and have agreed to pay it back in one year. During the year, however, prices double. That means that when you pay the money back, it will buy only half as much as it could have bought when you borrowed it. That is good for you but tough on the person who lent you the money. Of course, if you and your friend had anticipated such rapid inflation, you might have agreed to pay back a larger sum to adjust for it. When people anticipate inflation, they can adjust for its consequences in determining future obligations. But unanticipated inflation helps borrowers and hurts lenders.

Inflation's impact on future claims can be particularly hard on people who must live on a fixed income, that is, on an income that is predetermined through some contractual arrangement and does not change with economic conditions. Retirement pensions sometimes generate fixed income. Inflation erodes the value of such payments.

Given the danger posed by inflation for people on fixed incomes, many retirement plans provide for indexed payments. An indexed payment is one whose amount changes with the rate of change in the price level. If a payment changes at the same rate as the rate of change in the price level, the purchasing power of the

payment remains constant. Social security payments, for example, are indexed to maintain their purchasing power.

Uncertainty can be particularly pronounced in countries where extremely high inflation is a threat. **Hyperinflation** is generally defined as an inflation rate in excess of 200% per year. Inflation of that magnitude erodes the value of money very quickly. Hyperinflations occurred in Germany in the 1920s and in Yugoslavia in the early 1990s. There are stories about how people in Germany during the hyperinflation brought wheelbarrows full of money to stores to pay for ordinary items.

The **inflation rate** rose to an astronomical rate in 2008 in Zimbabwe. As the government printed more money and put it in circulation, prices rose. When inflation began to accelerate, the government found it "necessary" to print more and more money, causing prices to rise very fast. The inflation rate in Zimbabwe reached an astonishing 11.2 million percent in July of 2008. A loaf of bread cost 200,000 Zimbabwe dollars in February 2008. That same loaf cost 1.6 trillion Zimbabwe dollars by August 2008.

Do the problems associated with inflation imply that deflation would be a good thing? The answer is simple: no. Like inflation, **deflation** changes the value of money and the value of future obligations. It also creates uncertainty about the future.

If there is deflation, the real value of a given amount of money rises. In other words, if there had been deflation since 2000, a $10 bill you had stashed away in 2000 would buy more goods and services today. That sounds good, but should you buy $10 worth of goods and services now when you would be able to buy even more for your $10 in the future if the deflation continues? When Japan experienced deflation in the late 1990s and early 2000s, Japanese consumers seemed to be doing just that – waiting to see if prices would fall further. They were spending less per person and, as we will see throughout our study of macroeconomics, less consumption often meant less output, fewer jobs, and the prospect of a recession.

Unanticipated deflation hurts borrowers and helps lenders. The threat of deflation can make people reluctant to borrow for long periods. Borrowers become reluctant to enter into long-term contracts because they fear that deflation will raise the value of

the money they must pay back in the future. In such an environment, firms may be reluctant to borrow to build new factories, for example. This is because they fear that the prices at which they can sell their output will drop, making it difficult for them to repay their loans.

In the 20th century, there was a period of deflation after World War I and again during the Great Depression in the 1930s.

Price Index

Economists measure the price level with a price index. A price index is a number whose movement reflects movement in the average level of prices. If a price index rises 10%, it means the average level of prices has risen 10%.

There are four steps one must take in computing a price index:

1. Select the kinds and quantities of goods and services to be included in the index. A list of these goods and services, and the quantities of each, is the '**market basket**' for the index.
2. Determine what it would cost to buy the goods and services in the market basket in some period that is the base period for the index. A **base period** is a time period against which costs of the market basket in other periods will be compared in computing a price index. Most often, the base period for an index is a single year.
3. Compute the cost of the market basket in the **current period**.
4. Compute the price index. It equals the current cost divided by the base-period cost of the market basket.

Price index = current cost of basket / base-period cost of basket

While published price indexes are typically reported with this number multiplied by 100, our work with indexes will be simplified by omitting this step.

The Consumer Price Index (CPI)

One widely used price index is the consumer price index (CPI), a price index whose movement reflects changes in the prices of goods and services typically purchased by consumers. It is sometimes called the Laspeyres index. The CPI is often used to measure changes in the cost of living, though as we shall see, there are problems in using it for this purpose.

The market basket for the CPI contains thousands of goods and services. The major categories of items in the CPI are food and beverages, housing, apparel, transportation, medical care, recreation, education and communication, and other goods and services. Like many other price indexes, the CPI is computed with a fixed market basket. The composition of the basket generally remains unchanged from one period to the next. Because buying patterns change, however, the basket is revised accordingly.

The current cost of the basket of consumer goods and services is then compared to the base-period cost of that same basket. CPI thus reflects the ratio of the current cost of the basket divided by its base-period cost.

CPI = current cost of basket / base year cost of basket

The Laspeyres index can be presented in the following formula:

$$P_L = \frac{\sum(p_{c,t_n}) * (q_{c,t_0})}{\sum(p_{c,t_0}) * (q_{c,t_0})},$$ where $P_{c,tn}$ in the numerator are prices of year t_n; *and* $P_{c,t0}$ of the denominator are the prices of base year t_0 ; Qc,t_0 of both the numerator and the denominator represent base year variables. Thus the numerator shows the current cost of basket and the denominator shows the cost of basket in the base year

Computing the Rate of Inflation or Deflation

The rate of inflation or deflation is the percentage rate of change in a price index between two periods. Given price-index values for two periods, we can calculate the rate of inflation or deflation as the change in the index divided by the initial value of the index, stated as a percentage:

Rate of inflation or deflation = percentage change in index / initial value of index

To calculate inflation over the 2007–2008 period, for example, we could apply the equation to the price indexes. The price index in 2008 is 1.06 and 2007 is a base year, so its index equals 1.0. Inflation rate in 2008 = (1.06−1.00) / 1.00 = 0.06 = 6%.

The CPI is often used for calculating price-level change for the economy. For example, the rate of inflation in U.S. in 2007 can be computed from the December 2006 price level (2.016) and the December 2007 level (2.073):

$$\text{Inflation rate} = (2.073-2.016) / 2.016 = 0.028 = 2.8\%$$

Price indexes are useful. They allow us to see how the general level of prices has changed. They allow us to estimate the rate of change in prices, which we report as the rate of inflation or deflation. And they give us a tool for converting nominal values to real values so we can make better comparisons of economic performance across time.

Key concepts

- Inflation is an increase in the average level of prices, and deflation is a decrease in the average level of prices.
- Inflation and deflation affect the real value of money, of future obligations measured in money, and of fixed incomes. Unanticipated inflation and deflation create uncertainty about the future.
- The rate of inflation or deflation is the percentage rate of change in a price index.

UNIT 7.4 Unemployment

Learning objectives

1. Explain how unemployment is measured.
2. Define three different types of unemployment.
3. Define and illustrate graphically what is meant by the natural level of employment. Relate the natural level of employment to the natural rate of unemployment.
4. Explain the meaning of the Okun's law.

For an economy to produce all it can and achieve a solution on its production possibilities curve, the factors of production in the economy must be fully employed. Failure to fully employ these factors leads to a solution inside the production

possibilities curve in which society is not achieving the output it is capable of producing.

In thinking about the employment of society's factors of production, we place special emphasis on labor. The loss of a job can wipe out a household's entire income; it is a more compelling human problem than unemployed capital, such as a vacant apartment.

Measuring Unemployment

The adult population can be divided into three groups. Those who have jobs are counted as employed; those who do not have jobs but are looking for them and are available for work are counted as unemployed; and those who are not working and are not looking for work are not counted as members of the labor force. So we define a person as **unemployed** if he or she is not working but is looking for and available for work. The **labor force** is the total number of people working or unemployed.

The **unemployment rate** is the percentage of the labor force that is unemployed. It is computed as the number of people unemployed divided by the labor force — the sum of the number of people not working but available and looking for work plus the number of people working. The rate is expressed in percentage. For example, in October 2008, the unemployment rate in the USA was 6.5%.

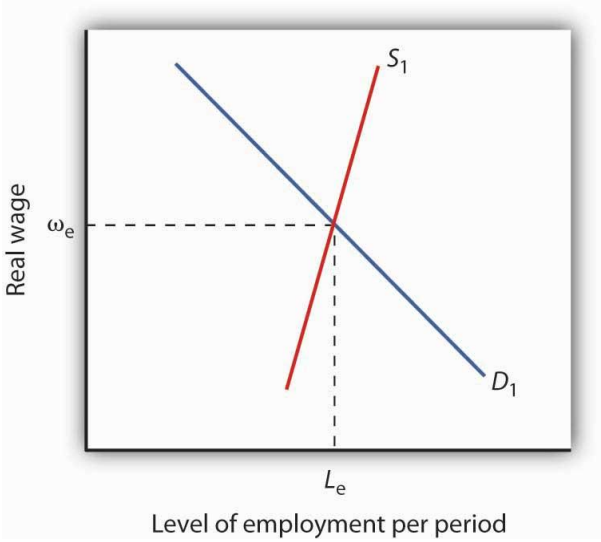
Types of Unemployment

Workers may find themselves unemployed for different reasons. Each source of unemployment has quite different implications, not only for the workers it affects but also for public policy.

Figure 7.4 *The Natural Level of Employment* applies the demand and supply model to the labor market. The price of labor is taken as the **real wage**, which is the nominal wage divided by the price level; the symbol used to represent the real wage is the Greek letter omega, **ω**. The supply curve is drawn as upward sloping, though steep, to reflect studies showing that the quantity of labor supplied at any one time is nearly fixed. Thus, an increase in the real wage induces a relatively small increase in the quantity of labor supplied. The demand curve shows the quantity of labor demanded at each real wage. The lower the real wage, the greater the quantity of

labor firms will demand. In the case shown here, the real wage, **ωe**, equals the equilibrium solution defined by the intersection of the demand curve $\boldsymbol{D_1}$ and the supply curve $\boldsymbol{S_1}$. The quantity of labor demanded, ***L*e**, equals the quantity supplied. The employment level at which the quantity of labor demanded equals the quantity supplied is called the **natural level of employment**. It is sometimes referred to as full employment.

Figure 7.4 *The Natural Level of Employment*



Even if the economy is operating at its natural level of employment, there will still be some unemployment. The rate of unemployment consistent with the natural level of employment is called the **natural rate of unemployment**. There are such types of unemployment as frictional unemployment, structural unemployment and cyclical unemployment.

Frictional Unemployment

Even when the quantity of labor demanded equals the quantity of labor supplied, not all employers and potential workers have found each other. Some workers are looking for jobs, and some employers are looking for workers. During the time it takes to match them up, the workers are unemployed. Unemployment that occurs because it takes time for employers and workers to find each other is called frictional unemployment.

The case of college graduates engaged in job searches is a good example of frictional unemployment. Most of them will find jobs, but it will take time. During

that time, these new graduates will be unemployed. If information about the labor market were costless, firms and potential workers would instantly know everything they needed to know about each other and there would be no need for searches on the part of workers and firms. There would be no frictional unemployment. But information is costly. Job searches are needed to produce this information, and frictional unemployment exists while the searches continue.

The government may attempt to reduce frictional unemployment by focusing on its source: information costs. Many state agencies, for example, serve as clearinghouses for job market information. They encourage firms seeking workers and workers seeking jobs to register with them. To the extent that such efforts make labor-market information more readily available, they reduce frictional unemployment.

Structural Unemployment

Another reason there can be unemployment even if employment equals its natural level stems from potential mismatches between the skills employers seek and the skills potential workers offer. Every worker is different; every job has its special characteristics and requirements. The qualifications of job seekers may not match those that firms require. Even if the number of employees firms demand equals the number of workers available, people whose qualifications do not satisfy what firms are seeking will find themselves without work. Unemployment that results from a mismatch between worker qualifications and the characteristics employers require is called structural unemployment.

Structural unemployment emerges for several reasons. Technological change may make some skills obsolete or require new ones. The widespread introduction of personal computers since the 1980s, for example, has lowered demand for typists who lacked computer skills.

Structural unemployment can occur if too many or too few workers seek training or education that matches job requirements. Students cannot predict precisely how many jobs there will be in a particular category when they graduate, and they are not likely to know how many of their fellow students are training for these jobs.

Structural unemployment can easily occur if students guess wrong about how many workers will be needed or how many will be supplied.

Structural unemployment can also result from geographical mismatches. Economic activity may be booming in one region and slumping in another. It will take time for unemployed workers to relocate and find new jobs. And poor or costly transportation may block some urban residents from obtaining jobs only a few miles away.

Public policy responses to structural unemployment generally focus on job training and education to equip workers with the skills firms demand. The government publishes regional labor-market information, helping to inform unemployed workers of where jobs can be found.

Although government programs may reduce frictional and structural unemployment, they cannot eliminate it. An economy at its natural level of employment will therefore have frictional and structural unemployment.

Cyclical Unemployment

The economy may not be operating at its natural level of employment, so unemployment may be above or below its natural level. Cyclical unemployment is unemployment in excess of the unemployment that exists at the natural level of employment. During recessions, the part of unemployment that is cyclical unemployment grows. The analysis of fluctuations in the unemployment rate, and the government's responses to them, will be discussed in later parts, where we will explore what happens when the economy generates employment greater or less than the natural level.

The Okun's law

Consequences of cyclical unemployment for the level of production can be demonstrated using the Okun's law. In economics, **Okun's law** (named after Arthur Melvin Okun, who proposed the relationship in 1962) is an empirically observed relationship between unemployment and losses in a country's production. The "gap version" states that for every 1% increase in the unemployment rate, a country's GDP

will be roughly an additional 2% lower than its potential GDP. The stability and usefulness of the law has been disputed.

Okun's law states that a one-point increase in the cyclical unemployment rate is associated with two percentage points of negative growth in real GDP. The relationship varies depending on the country and time period under consideration, often between 2% and 3%.

Mathematical statement: The gap version of Okun's law may be written as:

$$\bar{Y} - Y / \bar{Y} = \beta (u - \bar{u}),$$

where $\bar{Y}$ is potential GDP, Y is the actual GDP; $\bar{u}$ is natural level of unemployment, and **u** is the actual rate of unemployment and **β** is the factor relating changes in unemployment to changes in output, say, in our example the Okun's coefficient **β** equals 2.5. An example: a 2% excess of the actual unemployment rate over the natural level means that the lag of the actual GDP and the potential level of GDP in our example is 2 times 2.5 = 5%.

Key concepts

- People who are not working but are looking and available for work at any one time are considered **unemployed**. The unemployment rate is the percentage of the labor force that is unemployed.
- When the labor market is in equilibrium, employment is at the natural level and the unemployment rate equals the **natural rate of unemployment**.
- Even if employment is at the natural level, the economy will experience frictional and structural unemployment.
- **Cyclical unemployment** is unemployment in excess of that associated with the natural level of employment.
- **Okun's law** states that a one percent increase in the cyclical unemployment rate may lead to two percentage points of negative growth in real GDP.

UNIT 7.5 the Phillips Curve

Learning objectives

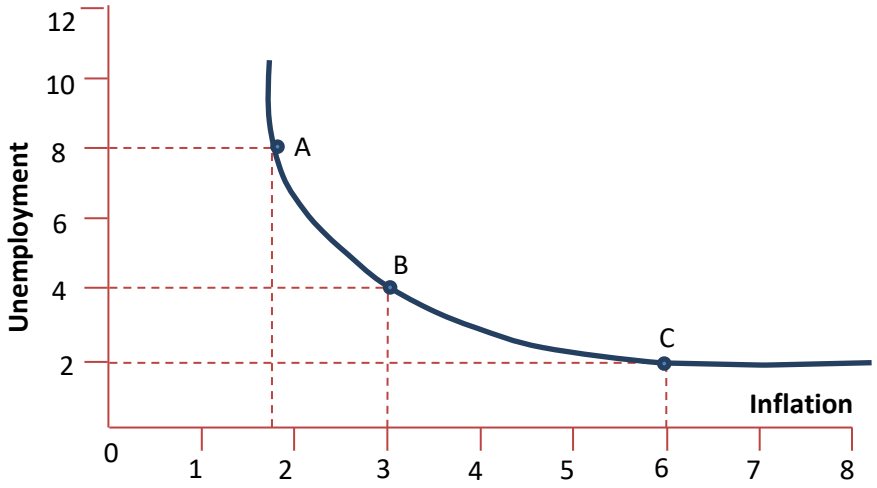
1. Draw a Phillips curve and describe the relationship between inflation and unemployment that it expresses.
2. Describe the other relationships or phases that have been observed between inflation and unemployment.

This chapter examines the relationship between inflation and unemployment. There have been periods in which a clear trade-off between inflation and unemployment seemed to exist. During such periods, the economy achieved reductions in unemployment at the expense of increased inflation. But there have also been periods in which inflation and unemployment rose together and periods in which both variables fell together.

In 1958, A.W. Phillips, the British economist of the London School of Economics (LCE), described the trade-off or inverse relationship between inflation and unemployment in what came to be known as the Phillips' curve. Phillips studied the history of wages and unemployment in Great Britain between 1861 and 1913. He found an interesting relationship between these two economic indicators which he summarized in the following figure.

As you can see in Figure *The Phillips' curve*, the vertical axis represents the unemployment rate, and the horizontal axis represents the rate of inflation. You can also see that the lower the rate of inflation, the higher the unemployment rate, and vice versa. For example, according to the information contained in the graph, with inflation running at a low 1.75 percent annual rate, unemployment would be 8 percent. With inflation at 3 percent, unemployment would be reduced to 4 percent. Double the inflation rate again (to 6 percent), and unemployment would be reduced to 2 percent.

Figure 7.5 The Phillips' curve



But something happened in the late 1970s and early 1980s that led economists to question the reliability of Phillips' curves. The economy was stagnant and suffering from relatively high rates of inflation and unemployment. For example, in 1979 with inflation running at an annual rate of 11 percent, unemployment stood at about 5.75 percent of the labor force in the USA. The following year the inflation rate rose to 13 percent, but instead of falling, the unemployment rate rose to 7 percent.

Economists are still debating the value of the Phillips' curve. Those who see it as a useful tool for understanding the economy point to the successful effort of the Reagan Administration to reduce inflation in the early 1980s. It was government's willingness to push unemployment to record levels that finally brought inflation under control. Those who disagree say that while the Phillips' curve provides an interesting picture of past history, it should not be used to design economic policies for the future.

Clearly, it is desirable to reduce unemployment and inflation. Unemployment represents a lost opportunity for workers to engage in productive effort and to earn income. Inflation erodes the value of money people hold, and more importantly, the threat of inflation adds to uncertainty and makes people less willing to save and firms less willing to invest. If there were a trade-off between the two, we could reduce the rate of inflation or the rate of unemployment, but not both.

The Phillips curve seemed to make good theoretical sense. The dominant school of economic thought in the 1960s suggested that the economy was likely to

experience either a recessionary or an inflationary gap. An economy with a recessionary gap would have high unemployment and little or no inflation. An economy with an inflationary gap would have very little unemployment and a higher rate of inflation. The Phillips curve suggested a smooth transition between the two. As expansionary policies were undertaken to move the economy out of a recessionary gap, unemployment would fall and inflation would rise. Policies to correct an inflationary gap would bring down the inflation rate, but at a cost of higher unemployment.

Key concepts

- The view that there is a trade-off between inflation and unemployment is expressed by a Phillips curve.
- While there are periods in which a trade-off between inflation and unemployment exists, the actual relationship between these variables may be a more difficult to identify.
- In a Phillips phase, the inflation rate rises and unemployment falls. A stagflation phase is marked by rising unemployment while inflation remains high. In a recovery phase, inflation and unemployment both fall.

Chapter 7. A Multiple Choice Test

1. The potential economic growth can be represented on the chart as:

a) shift to the right of the production possibility curve;

b) shift to the left of the production possibility curve;

c) a movement from one point on the production possibility curve upwards to another point on the curve;

d) a movement from one point on the production possibility curve downwards to another point on the curve.

2. The unemployment rate is:

a) the sum of the levels of frictional and structural unemployment;

b) ratio of the unemployed to the labour force;

c) the share of the unemployed that corresponds to the appropriate level of employment.

3. For health reasons, the engineer moved to another city and did not work for a month and a half because of the move. This should be taken into account in the calculation of:

a) both frictional and structural unemployment;

b) cyclical unemployment;

c) frictional unemployment;

d) structural unemployment.

4. Natalia quit her job as a sales assistant and spent 3 weeks to find a new job as a manager. During the search for Natalia's work it should be taken into account in the calculation of:

a) both frictional and structural unemployment;

b) cyclical unemployment;

c) frictional unemployment;

d) structural unemployment.

5. The construction of power plants using oil as a source of energy was followed by the closure of a number of coal mines and the mass dismissal of miners. This contributed to an increase in:

a) both frictional and cyclical unemployment;

b) cyclical unemployment;

c) frictional unemployment;

d) structural unemployment.

6. Hyperinflation is typically caused by

a) high tax rates that discourage work effort

b) continuous expansion of the money supply to finance government budget deficits

c) trade surpluses that are caused by strong protectionist policies

d) bad harvests that lead to widespread shortages

e) a large decline in corporate profits that leads to a decrease in production

7. The official unemployment rate understates the unemployment level in the economy because the official unemployment rate

a) ignores the duration of unemployment

b) ignores underemployed and discouraged workers

c) includes jobs created by the underground economy

d) excludes all unemployed teenagers

e) excludes frictionally unemployed workers

8. According to the short-run Phillips curve, lower inflation rates are associated with

a) higher unemployment rates

b) higher government spending

c) larger budget deficits

d) greater labor-force participation rates

e) smaller labor-force participation rates

9. Which of the following individuals is considered officially unemployed?

a) Chris, who has not worked for more than three years and has given up looking for work

b) Kim, who is going to school full-time and is waiting until graduation before looking for a job

c) Pat, who recently left a job to look for a different job in another town

d) Leslie, who retired after turning 65 only five months ago

e) Lee, who is working 20 hours per week and is seeking full-time employment

10. The consumer price index (CPI) is designed to measure changes in the

a) spending patterns of urban consumers only

b) spending patterns of all consumers

c) wholesale price of manufactured goods

d) prices of all goods and services produced in an economy

e) cost of a select market basket of goods and services

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **Economic growth rate:** The real GDP increases from the previous year $200 billion to $210 billion this year. What is the of economic growth rate?

2. **Economic growth rate:** In 2013 nominal GDP was 4,000 money units and the real GDP was 2,500 money units. In 2014 nominal GDP increased by 20% compared with the previous year and the price deflator increased by 25%. 1) Compute the economic growth rate. 2) Define the business cycle phase.

3. **A change in real GDP:** If real GDP rose by 6% and the population increased by 3% in the same year. How did real GDP per capita change?

4. **Market basket and price index:** A typical movie fan rents movies on DVD and go to movies in theaters each month. At the theater, this viewer consumes soft drinks and popcorn. The market basket of movie goers includes 4 DVD rentals, 3 movie admissions, 3 soft drinks, and 3 servings of popcorn. Compute 1) the cost of the market basket in 2007 and 2008 using the data in the table below; 2) the price index for year 2008; 3) the inflation rate in 2008 assuming that the PI for base year 2007 is 1.0.

Item	Quantity	2007 Price	Cost in 2007	2008 Price	Cost in 2008
DVD rental	4	$2.25		$2.97	
Movie admission	3	7.75		8.00	
Popcorn	3	2.25		2.25	
Soft drink	3	3.00		2.75	
Total cost of basket	-	**2007**		**2008**	

5. **Real wages and CPI:** Suppose your uncle started college in 1998 and had a job busing dishes that paid $5 per hour. In 2008 you had the same job; it paid $6 per hour. The CPI in 1998 was 163.0; in 2008 it was 216.5. Compute real values using price indexes. Which job paid more and how much more in percentage points?

6. **Inflation rate:** Suppose that the implicit price deflator has gone from 1.063 in 2003 to 1.091 in 2004. 1) Using the percentage change in the implicit price deflator as the gauge, compute what the inflation rate was over the period?

7. **Unemployment**: Use the data in the table to compute the unemployment rate in Year One and in Year Two. Explain why, in this example, both the number of people employed and the unemployment rate increased.

Year	Number employed (in millions)	Number unemployed (in millions)
1	20	2
2	21	2.4

8. **Unemployment and GDP:** Nominal GDP is $750 billion, natural unemployment rate is 5%, actual unemployment rate is 9%. What is the loss in the volume of production in the country in money terms when the unemployment rate is higher than the natural level of unemployment (assuming the Okun's coefficient equals 2.5)?

9. **Unemployment:** The decrease in inflation by 1 percentage point is associated with a fall in real GDP by 5% per year. According to the Okun's law, the deviation of the unemployment rate from the natural rate by 1 percentage point causes changes in GDP by 2% over the same period. What will the level of cyclical unemployment be if inflation falls by 3 percentage points

10. **Recessionary gap:** Compute the gap between the potential GDP and the actual GDP if the actual unemployment rate is 4 percentage points higher than the natural level of unemployment (assuming the Okun's coefficient equals 2.5).

CHAPTER 8. MACROECONOMIC POLICIES. MONETARY POLICY

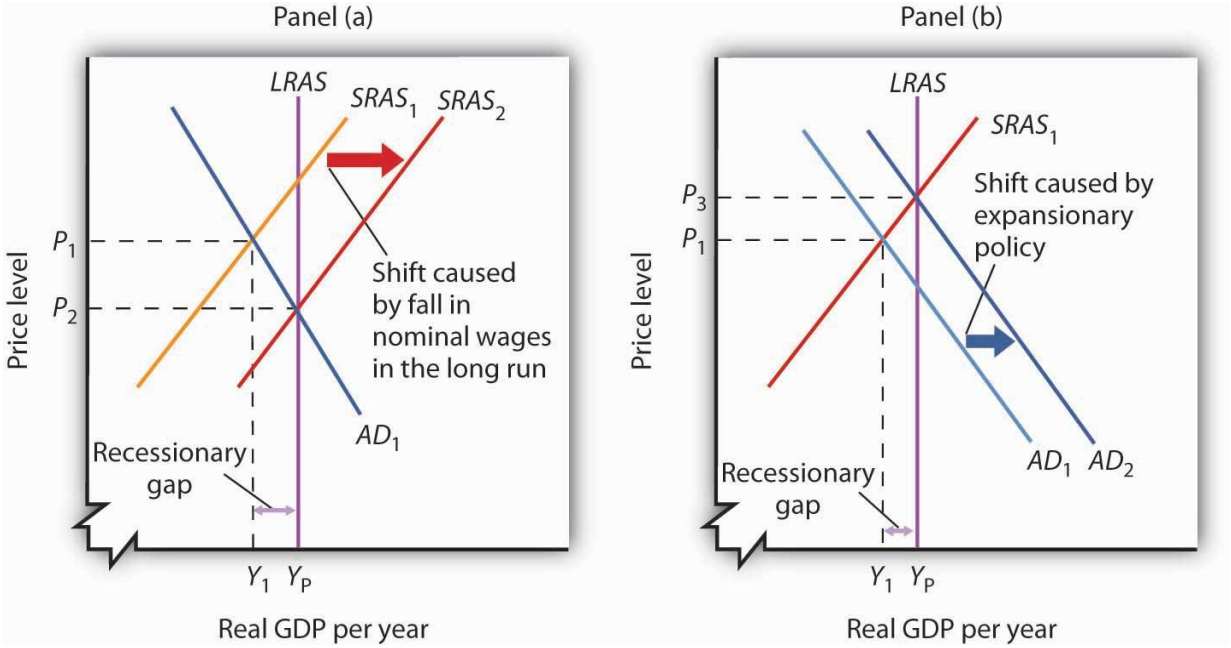
UNIT 8.1 Gaps in the AD-AS Model and Public Policy

There are two alternatives to deal with gaps. First, governments can do nothing, and this is called a **nonintervention policy.** In the long run, real wages will adjust to the equilibrium level, employment will move to its natural level, and real GDP will move to its potential. Second, governments can do something. Faced with a recessionary or an inflationary gap, policy makers can undertake policies aimed at shifting the *AD* or *SRAS* curves in a way that moves the economy to its potential. A policy in which the government or central bank acts to move the economy to its potential output is called a **stabilization policy**.

Nonintervention or Expansionary Policy?

Figure 8.1 *Alternatives in Closing a Recessionary Gap* illustrates the two alternatives for closing a recessionary gap. In both panels, the economy starts with a real GDP of *Y*1 and a price level of *P*1. There is a recessionary gap equal to $Y_P - Y_1$.

Figure 8.1 *Alternatives in Closing a Recessionary Gap*



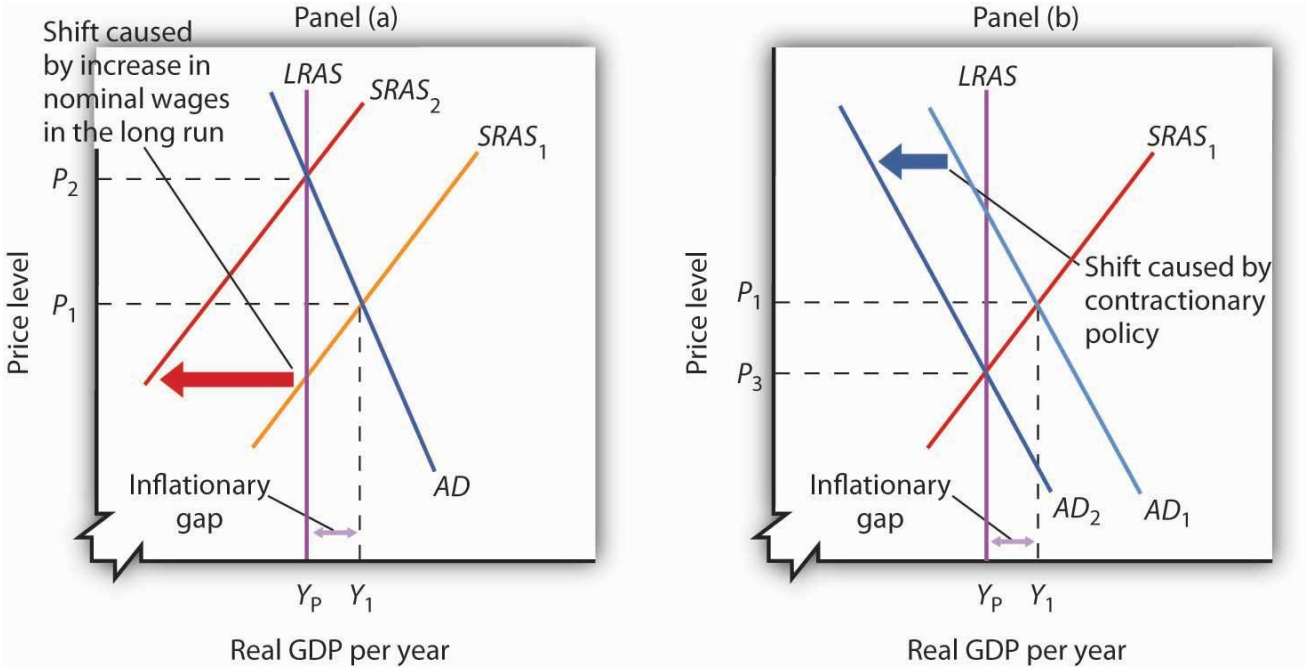
In Panel (a), the economy closes the gap through a process of self-correction. Real and nominal wages will fall as long as employment remains below the natural level. Lower nominal wages shift the *SRAS* curve. The process is a gradual one, however, given the stickiness of nominal wages, but after a series of shifts in the

SRAS curve, the economy moves toward equilibrium at a price level of P_2 and its potential output of Y_P.

Panel (a) illustrates a gradual closing of a recessionary gap. Under a nonintervention policy, *SRAS* shifts from $SRAS_1$ to $SRAS_2$. Panel (b) shows the effects of expansionary policy acting on aggregate demand to close the gap.

Panel (b) illustrates the stabilization alternative. Faced with an economy operating below its potential, public officials act to stimulate aggregate demand. For example, the government can increase government purchases of goods and services or cut taxes. Tax cuts leave people with more after-tax income to spend, boost their consumption, and increase aggregate demand. As AD_1 shifts to AD_2 in Panel (b) of Figure 8.2 *Alternatives in Closing a Recessionary Gap*, the economy achieves output of Y_P, but at a higher price level, P_3. A **stabilization policy** designed to increase real GDP is known as an **expansionary policy**.

Figure 8.2 *Alternatives in Closing an Inflationary Gap*



To sum up, Panel (a) illustrates a gradual closing of an inflationary gap. Under a nonintervention policy, SRAS shifts from $SRAS_1$ to $SRAS_2$. Panel (b) shows the effects of contractionary policy to reduce aggregate demand from AD_1 to AD_2 in order to close the gap.

Nonintervention or Contractionary Policy?

Figure 8.2 *Alternatives in Closing an Inflationary Gap* illustrates the alternatives for closing an inflationary gap. Employment in an economy with an inflationary gap exceeds its natural level – the quantity of labor demanded exceeds the long-run supply of labor. A nonintervention policy would rely on nominal wages to rise in response to the shortage of labor. As nominal wages rise, the *SRAS* curve begins to shift, as shown in Panel (a), bringing the economy to its potential output when it reaches $SRAS_2$ and P_2.

A **stabilization policy** that reduces the level of GDP is a **contractionary policy**. Such a policy would aim at shifting the aggregate demand curve from AD_1 to AD_2 to close the gap, as shown in Panel (b). A policy to shift the aggregate demand curve to the left would return real GDP to its potential at a price level of P_3.

For both kinds of gaps, a combination of letting market forces in the economy close part of the gap and of using stabilization policy to close the rest of the gap is also an option. There are essentially two types of stabilization policy: fiscal policy and monetary policy. Fiscal policy is the use of government purchases, transfer payments, and taxes to influence the level of economic activity. Monetary policy is the use of central bank policies to influence the level of economic activity.

UNIT 8.2 Monetary Policy

Learning objectives

1. Discuss the central bank's primary and secondary goals pursuing a monetary policy.
2. State and show graphically how expansionary and contractionary monetary policy can be used to close gaps.

The central banks play the major role in the implementation of the monetary policy in the country. There are four ways to do it:

1. to print money: coins, banknotes thus controlling the amount of banknotes in circulation.

2. to set discount interest rates or minimum rates to control the credit system. A country's minimum or discount interest rate is the rate at which the central bank makes loans to commercial banks. Banks lend to very large companies at the base rate, or the prime rate; all other borrowers pay more. Lowering the discount rate makes funds cheaper to banks. A lower discount rate could place downward pressure on interest rates in the economy.
3. to change reserve requirements.
4. to use open-market operations. Open market operations are the sale or purchase of government securities, such as bonds, in the open market in order to reduce or increase money supply. Open market operations are used mainly in the countries that have highly developed financial markets.

They can also use these tools in combination. In the next section of this chapter, where we discuss the notion of a liquidity trap, we will also introduce more extraordinary measures that the central banks have at their disposal.

Monetary policy is an economic policy implemented by the central bank of the country if it is independent. The purpose of monetary policy is to affect aggregate demand in the economy by changing the supply of money and/or the cost of money. **Money supply** is currency in circulation outsides banks plus the sight deposits of commercial banks against which the private sector can write cheques, which is nowadays replaced by using bank cards such as debit cards. In other words, this is the money used as a means of payment. The **cost of money** is the cost of lending and borrowing both by households and firms which is determined by the interest rates. The central bank's monopoly of the supply of cash allows it to control interest rates in the economy.

Thus central banks are responsible for implementing monetary policy, i.e. controlling – or attempting to control – firstly, the money supply and consequently inflation or, secondly, the interest rates. The change in money supply or in interest rates has an effect on the level of spending in the economy.

In the past, monetary policy was mainly focused on the control of the money supply. But there were difficulties in that because the supply of money is to a large

extent determined by demand for money. If people start borrowing more money, the resulting shortage of money in the banks will lead to an increase in interest rates. The banks will have an incentive to create extra credit to meet the demand for money at higher interest rate: money supply will expand. If banks find themselves short of liquidity, they can always borrow from the central bank.

The demand for money is a demand for **real money**, i.e. nominal money deflated by the price level to undertake a given quantity of transactions. Hence, when the price level doubles, other things equal, the demand for nominal money balances doubles as well, leaving the demand for real money balances unaltered. People want money because of its purchasing power in terms of the goods it will buy.

Today, monetary policy is primarily focused on the control of interest rates. Interest rates connect the present and the future, affecting spending decisions of both households and firms. Changing interest rates can be very effective. Since the early 1990s, most governments have used interest rate changes as the major means of keeping aggregate demand and inflation under control.

In some countries, the central bank is independent from the government. In the others, it is controlled by the government. In a country with an independent central bank, the government cannot manipulate the money supply (e.g. before the elections), but it can, of course, plan its taxation and spending policies with the date of the next election in mind. Many politicians in left-of-centre parties, for example, social democratic parties believe that governments should have the possibility to increase the money supply during recessions, in order to reduce unemployment. This is the idea of Keynesians who argue that the central bank should be controlled by the elected government, rather than by bankers, who are generally unsympathetic to Keynesian ideas and more concerned with preserving price stability than reducing the level of unemployment. However, there is evidence that in the countries with independent central banks both inflation rate and the budget deficit are lower, for example, in the European euro-zone countries that lost the ability to manipulate their money supply or interest rates after the introduction of the euro in 2002.

The Equation of Exchange

We can relate the money supply to the aggregate economy by using the equation of exchange: ***MV* = nominal GDP**

The equation of exchange shows that the money supply (***M)*** times its velocity (***V)*** equals nominal GDP. **Velocity** is the number of times the money supply is spent to obtain the goods and services that make up GDP during a particular time period.

To see that nominal GDP is the price level multiplied by real GDP, recall from an earlier chapter that the implicit price deflator, or price level *P* equals nominal GDP divided by real GDP:

$$P = \text{Nominal GDP} / \text{Real GDP}$$

Multiplying both sides by real GDP, we have Nominal GDP = $P \times$ Real GDP

Letting ***Y*** equal real GDP, we can rewrite the equation of exchange as

$$MV = PY$$

The left side, *MV,* gives the money supply times the number of times that money is spent on goods and services during a period. It thus measures total spending. The right side is nominal GDP. But that is a measure of total spending on goods and services as well. Nominal GDP is the value of all final goods and services produced during a particular period. In effect, the equation of exchange says simply that total spending on goods and services, measured as *MV*, equals total spending on goods and services, measured as *PY* (or nominal GDP). The equation of exchange is thus a mathematical expression that is true by definition.

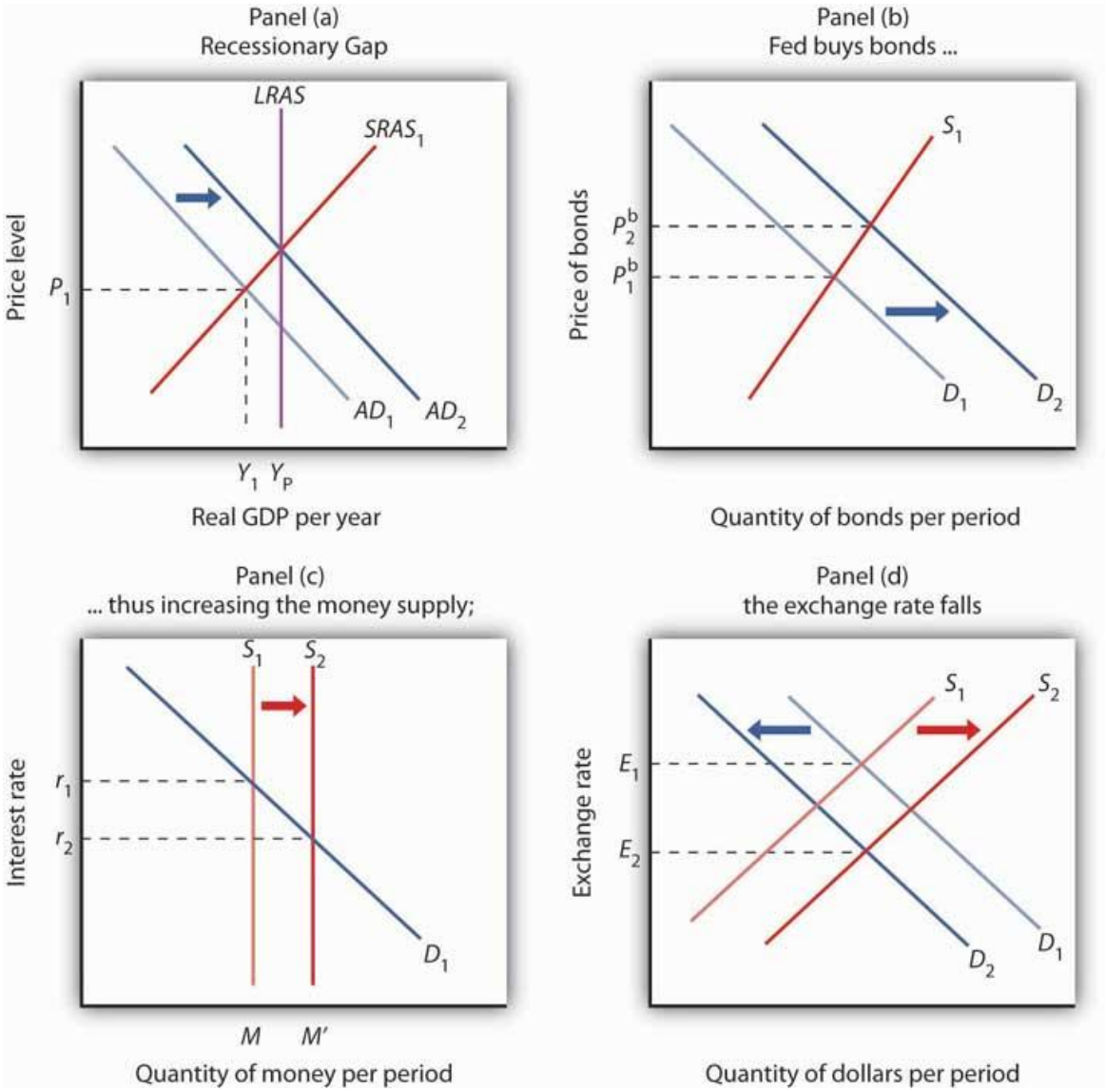
Expansionary Monetary Policy

The CB might pursue an expansionary monetary policy in response to the initial situation shown in Panel (a) of Figure 8.3 *Expansionary Monetary Policy to Close a Recessionary Gap*. An economy with a potential output of Y_P is operating at Y_1; there is a recessionary gap.

One possible policy response is to allow the economy to correct this gap on its own, waiting for reductions in nominal wages and other prices to shift the short-run aggregate supply curve $SRAS_1$ to the right until it intersects the aggregate demand curve AD_1 at Y_P. An alternative is a stabilization policy that seeks to increase

aggregate demand to AD_2 to close the gap. An expansionary monetary policy is one way to achieve such a shift.

Figure 8.3 *Expansionary Monetary Policy to Close a Recessionary Gap*



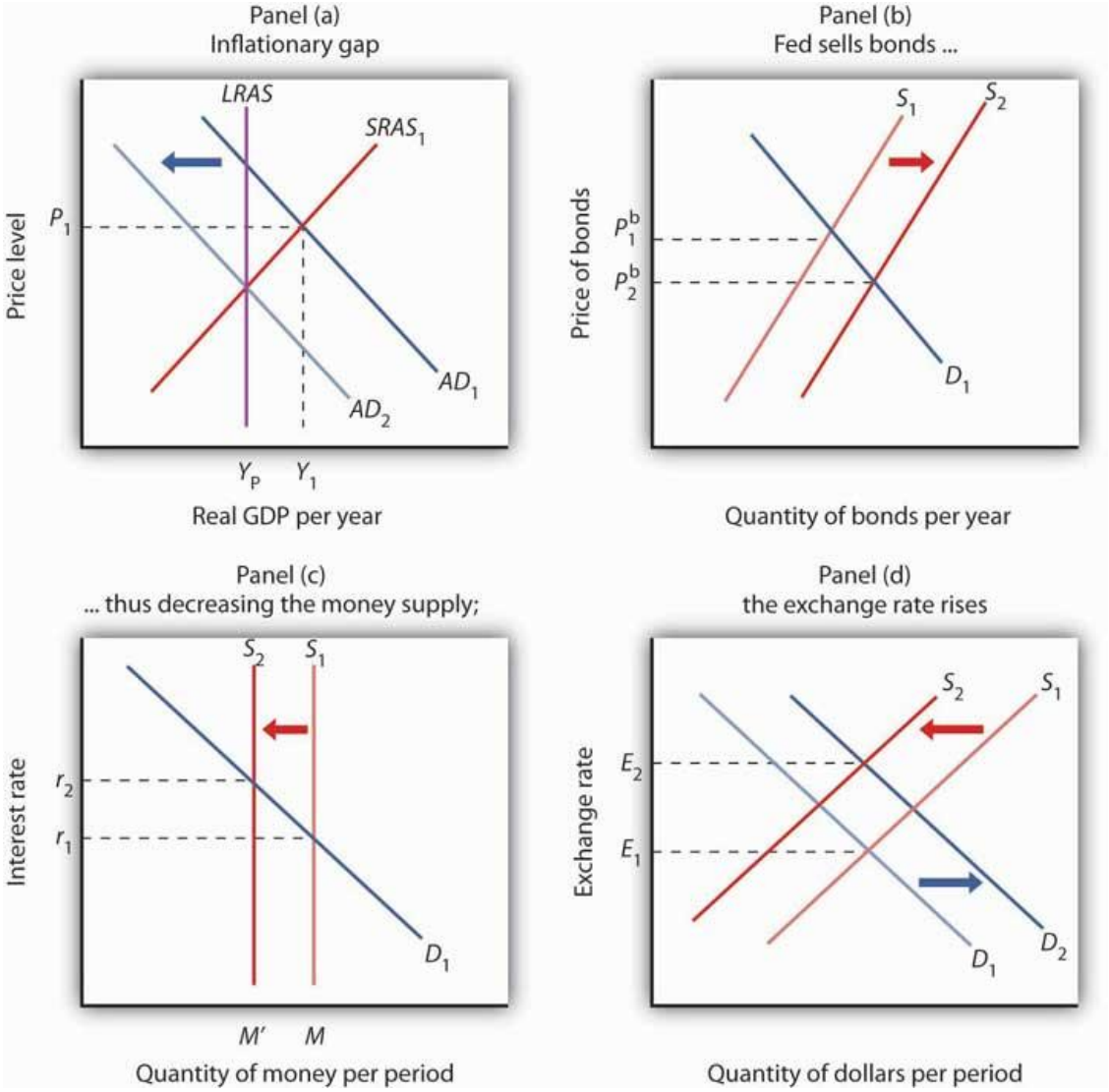
To carry out an expansionary monetary policy, the CB will buy bonds, thereby increasing the money supply. That shifts the demand curve for bonds to D_2, as illustrated in Panel (b). Bond prices rise to *P*b2. The higher price for bonds reduces the interest rate. These changes in the bond market are consistent with the changes in the money market, shown in Panel (c), in which the greater money supply leads to a fall in the interest rate to r_2. The lower interest rate stimulates investment. In addition, the lower interest rate reduces the demand for and increases the supply of dollars in the currency market, reducing the exchange rate to E_2 in Panel (d). The lower

exchange rate will stimulate net exports. The combined impact of greater investment and net exports will shift the aggregate demand curve to the right. The curve shifts by an amount equal to the multiplier times the sum of the initial changes in investment and net exports. In Panel (a), this is shown as a shift to AD_2, and the recessionary gap is closed.

Contractionary Monetary Policy

The central bank will generally pursue a contractionary monetary policy when it considers inflation a threat. Suppose, for example, that the economy faces an inflationary gap; the aggregate demand and short-run aggregate supply curves intersect to the right of the *LRAS* curve, as shown in Panel (a) of Figure 8.4 *A Contractionary Monetary Policy to Close an Inflationary Gap*.

Figure 8.4 *A Contractionary Monetary Policy to Close an Inflationary Gap*



To carry out a contractionary policy, the CB sells bonds. In the bond market, shown in Panel (b) of Figure *A Contractionary Monetary Policy to Close an Inflationary Gap*, the supply curve shifts to the right, lowering the price of bonds and increasing the interest rate.

In the money market, shown in Panel (c), the CB's bond sales reduce the money supply and raise the interest rate. The higher interest rate reduces investment. The higher interest rate also induces a greater demand for dollars as foreigners seek to take advantage of higher interest rates in the country. The supply of money falls; people in the country are less likely to purchase foreign interest-earning assets now that domestic assets are paying a higher rate.

These changes boost the exchange rate, as shown in Panel (d), which reduces exports and increases imports and thus causes net exports to fall. The contractionary monetary policy thus shifts aggregate demand to the left, by an amount equal to the multiplier times the combined initial changes in investment and net exports, as shown in Panel (a).

Key concepts

- The central bank's goal is to control inflation or the price stability. Providing that inflation is under control, the CB will act to close recessionary gaps.
- Expansionary policy, such as a purchase of government bonds, tends to push bond prices up and interest rates down, increasing investment and aggregate demand.
- Contractionary policy, such as a sale of government bonds, pushes bond prices down, interest rates up, investment down, and aggregate demand shifts to the left.

UNIT 8.3 Problems of the Monetary Policy

Learning objectives

1. Explain the three kinds of lags that can influence the effectiveness of monetary policy.

2. Identify the macroeconomic targets at which the CB can aim in managing the economy, and discuss the difficulties inherent in using each of them as a target.
3. Discuss how each of the following influences a central bank's ability to achieve its desired macroeconomic outcomes: political pressures and the degree of impact on the economy (including the situation of a liquidity trap).

Despite the apparent ease with which CB can conduct monetary policy, it still faces difficulties in its efforts to stabilize the economy. We examine some of the problems and uncertainties associated with monetary policy in this section.

Lags

Perhaps the greatest obstacle facing any central bank, is the problem of lags. It is easy enough to show a recessionary gap on a graph and then to show how monetary policy can shift aggregate demand and close the gap. In the real world, however, it may take several months before anyone even realizes that a particular macroeconomic problem is occurring. When monetary authorities become aware of a problem, they can act quickly to inject reserves into the system or to withdraw reserves from it. Once that is done, however, it may be a year or more before the action affects aggregate demand.

Only after policy makers recognize there is a problem can they take action to deal with it. The delay between the time at which a problem is recognized and the time at which a policy to deal with it is enacted is called the implementation lag. For monetary policy changes, the implementation lag is quite short. The problem of lags suggests that monetary policy should respond not to statistical reports of economic conditions in the recent past but to conditions *expected* to exist in the future.

Choosing Targets

In attempting to manage the economy, the CB must have some target, or set of targets, that it wants to achieve. Possible targets include interest rates, money growth rates, and the price level or expected changes in the price level.

Price Level or Expected Changes in the Price Level

Some economists argue that the CB primary goal should be price stability. If so, an obvious possible target is the price level itself. The CB could target a particular

price level or a particular rate of change in the price level and adjust its policies accordingly. If, for example, the CB sought an inflation rate of 2%, then it could shift to a contractionary policy whenever the rate rose above 2%.

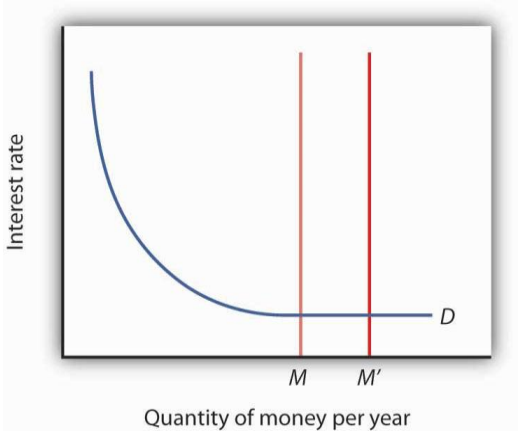
Advocates of inflation rate targeting argue that it is important to focus not on the past rate of inflation or even the current rate of inflation, but on the expected rate of inflation.

Non-traditional monetary tools: a liquidity trap and quantitative easing

What if the CB cannot bring about a change in interest rates? A liquidity trap is said to exist when a change in monetary policy has no effect on interest rates. This would be the case if the money demand curve were horizontal at some interest rate, as shown in Figure 8.5 *A Liquidity Trap*. If a change in the money supply from *M* to *M*' cannot change interest rates, then traditional monetary policy is rendered totally ineffective. At an interest rate of zero, since bonds cease to be an attractive alternative to money, which is at least useful for transactions purposes, there would be a liquidity trap.

In this case the central bank can pursue additional, nontraditional measures. The aim is to make firms and consumers want to spend now by using a tool not aimed at reducing the interest rate. It thus shifts its focus to the price level and to avoiding expected deflation. For example, if the public expects the price level to fall by 2% and the interest rate is zero, by holding money, the money is actually earning a positive *real* interest rate of 2% - the difference between the *nominal* interest rate and the expected deflation rate.

Figure 8.5 *A Liquidity Trap*



To combat this ‘wait-and-see’ mentality, the central bank, using a strategy referred to as **quantitative easing**, must convince the public that it will keep interest rates very low by providing substantial reserves for as long as is necessary to avoid deflation. In other words, it is aimed at creating expected inflation. If it is successful, this extraordinary form of expansionary monetary policy will lead to increased purchases of goods and services, compared to what they would have been with expected deflation. Also, by providing banks with lots of liquidity, it is hoping to encourage them to lend.

The Japanese economy provides an interesting modern example of a country that attempted quantitative easing. With a recessionary gap starting in the early 1990s and deflation in most years from 1995 on, Japan’s central bank, the Bank of Japan, began to lower the interest rate, reaching near zero by the late 1990s. With growth still languishing, Japan appeared to be in a traditional liquidity trap.

In late 1999, the Bank of Japan announced that it would maintain a zero interest rate policy for the foreseeable future, and in March 2001 it officially began a policy of quantitative easing. In 2006, with the price level rising modestly, Japan ended quantitative easing and began increasing the interest rate again. It should be noted that the government simultaneously engaged in expansionary fiscal policy.

How well did these policies work? The economy began to grow modestly in 2003, though deflation between 1% and 2% remained. Some researchers feel that the Bank of Japan ended quantitative easing too early. Also, delays in implementing the policy, as well as delays in restructuring the banking sector, exacerbated Japan’s problems.

Key concepts

- Potential targets for macroeconomic policy include interest rates, money growth rates, and the price level or expected rates of change in the price level.
- Even if a central bank is structured to be independent of political pressure, its officers are likely to be affected by such pressure.
- To counteract liquidity traps, central banks have used quantitative-easing.

Chapter 8. A Multiple Choice Test and Tasks

1. Expansionary monetary policy is:

a) the policy of 'expensive money';

b) the policy aimed at balancing the revenues and expenditures of the state budget;

c) the policy of 'neutral money'

d) the policy of 'cheap money'.

2. Contractionalry monetary policy is carried out;

a) in a stable economic environment;

b) in order to reduce inflation;

c) to stimulate business activity;

d) in order to increase money supply,

3. Suppose the Central Bank sells $8 million worth of bonds. How does money supply change?

1) It will increase.

2) It will decrease.

3) It will have no effect on money supply,

4. In the short run, an expansionary monetary policy would most likely result in which of the following changes in the price level and GDP?

Price Level	Real GDP
a) Decrease	Increase
b) No change	Decrease
c) Increase	Increase
d) Increase	Decrease

5. **Monetary policy** Suppose the economy has a recessionary gap. What monetary policies can be used to close the gap? Write cause-and-consequences chains to show how appropriate monetary measures and their effects in the bond market, money market, FOREX market will lead to the final goal – closing of the recessionary gap.

Numerical and graphical tasks.

1. **Velocity of money:** In an economy the price level ***P*** (implicit price deflator) equals 1.22; real GDP (***Y***) is $11,727.4 billion, and money supply (***M***) is $7,635.4 billion.

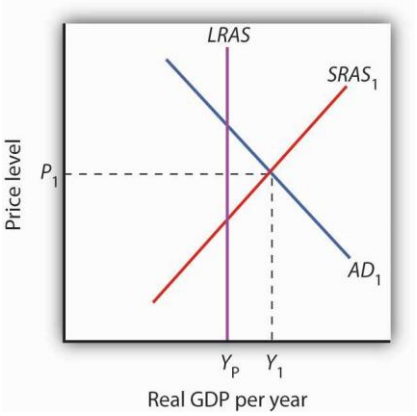
Compute the velocity of money (***V***) in a period of one month using the equation of exchange in the economy.

2. **Multiplier of government purchases:** The government increases purchases by 25 billion money units. Due to this measure the equilibrium gross national income increased by 100 billion money units. Compute the multiplier of government purchases.

3. **Taxation**: The government increased purchases by 24 billion money units. Due to this measure the equilibrium gross national income increased by 100 billion money units. The marginal propensity to consume (MPC) equaled 0.6. How much did the government decrease the taxation?

4. **Equilibrium GNI:** The government increases purchases from 30 to 40 billion money units and taxation from 40 to 50 billion money units. Due to this measure the equilibrium gross national income increased by 100 billion money units. The marginal propensity to consume (MPC) equals 0.6. How much will the equilibrium gross national income change?

5. **Gaps:** The figure shows an economy operating at a real GDP of Y1 and a price level of P1, at the intersection of AD1 and SRAS1.



1) What kind of gap is the economy experiencing?

2) What type of monetary policy (expansionary or contractionary) would be appropriate for closing the gap?

3) If the CB decided to pursue this policy, what type of open-market operations would it conduct?

4) How would bond prices, interest rates, and the exchange rate change?

5) How would investment and net exports change?

6) How would the AD curve shift?

6. **Monetary policy effects:** In 2005 the Fed was concerned about the possibility that the United States was moving into an inflationary gap, and it adopted a contractionary monetary policy as a result.

1) What monetary measures could the Fed take in this case?

2) Draw a four-panel graph showing this policy and its expected results. How did they affect money supply, the dollar exchange rate, and eventually aggregate demand?

- In Panel (a), show how the Fed's policy will affect the market for bonds.
- In Panel (b), show how the monetary policy will affect the demand for and supply of money.
- In Panel (c), show how it will affect the dollar exchange rate.
- In Panel (d), use the AD-AS model to illustrate the economy with an inflationary gap and how the gap was closed due to the monetary policy.

CHAPTER 9. FISCAL POLICY

UNIT 9.1 Government budget. Taxation and Spending

Learning objectives

1. Understand the major components of government spending and sources of government revenues.
2. Define the terms budget surplus, budget deficit, balanced budget, and national debt.

Fiscal policy refers to the government's efforts to keep the economy stable by increasing or decreasing taxes and government spending. High tax rates slow the economy because they take money out of the private sector and put it into the hands of government. They also discourage small businesses by decreasing profit margins. But high taxes also mean that more money is available in the budget to spend on education, health, defense, highways and social programs. In practice, most governments spend more than they collect in taxes, creating a national debt. Reducing this deficit is politically unpopular as it involves cutting public spending.

Types of taxes

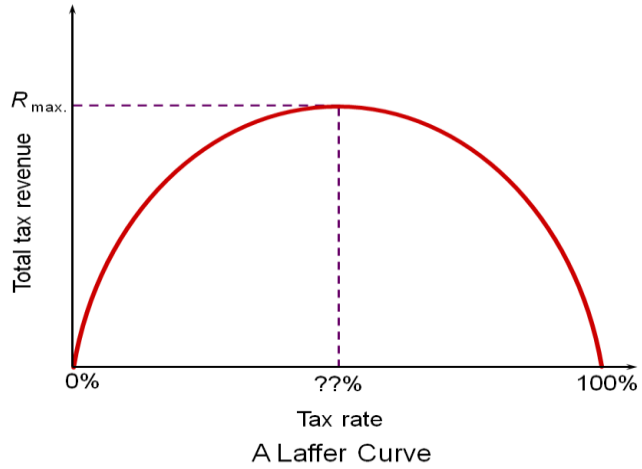
In most economies government revenues come mainly from direct taxes on personal incomes and company profits (corporate taxes) as well as indirect taxes levied on purchase of goods and services. The examples of indirect taxes are value added tax (VAT) and sales tax sometimes called excise duties.

The composition of government revenues differs from country to country. Some governments take a larger share, others a smaller share. For example, in the United Kingdom the government takes nearly 40 percent of national income in taxes.

The most widely used progressive tax structure is the one in which the average tax rate rises with a person's income level. As a result of progressive tax and transfer system most is taken from the rich and most is given to the poor. Sales tax is an example of a regressive tax added to the price of goods at the time they are sold because this tax takes a higher percentage of a low income and a lower percentage of high income.

Higher tax rates initially increase tax revenue but eventually result in such large falls in the equilibrium quantity of the taxed commodity that revenue starts to fall again. High tax rates are believed to reduce the incentive to work. If half of all we earn goes to the government, we may prefer to work fewer hours a week and spend more time going out or watching television.

Figure 9.1 *A Laffer curve*



This phenomenon is demonstrated by the **Laffer curve** in Figure 9.1. The Laffer Curve is a theory developed by supply-side economist Arthur Laffer to show the relationship between tax rates and the amount of tax revenue collected by governments. The curve is used to illustrate Laffer's argument that sometimes cutting tax rates can increase total tax revenue and is favorable for businesses and production.

Cuts in tax rates will usually reduce the tax burden and reduce the amount of taxes raised but might increase eventual revenue. If governments wish to reduce the tax burden and balance spending and revenue, they can reduce government spending and cut taxes.

Taxes affect the relationship between real GDP and personal disposable income; they therefore affect consumption. They also influence investment decisions. Taxes imposed on firms affect the profitability of investment decisions and therefore affect the levels of investment firms will choose. Income taxes have an impact on employment and on the real wages earned by workers.

The bulk of tax revenues come from the **personal income tax**. State and local tax revenues are dominated by **property taxes** and **sales taxes**. The federal government, as well as local governments, also collects taxes imposed on business firms, such as **taxes on corporate profits**.

Government spending

Most government spending is financed by tax revenue. Some small component of government spending is financed through government borrowing. Government spending comprises spending on goods and services and transfer payments.

To understand government spending, we have to distinguish private goods and public goods. A private good, if consumed by one person, cannot be consumed by others. For example, a bar of chocolate is a **private good**. If you eat it, nobody else can eat that particular bar of chocolate. Most of the goods produced in the economy are private goods. A public good, if consumed by one person, can be consumed by others in exactly the same quantities. Governments mostly pay for **public goods**, i.e. the goods that would not be provided by a free market. Traffic lights, lighthouses and national defense are examples of public goods. The consumption of a public good by one does not reduce the consumption of it by someone else. Governments also provide such public goods as police, fire-fighting, courts of law, etc.

In addition to public goods, government spending includes various transfer payments. A **transfer** is a payment, usually by the government, for which no corresponding service is provided in return. Examples are social security, retirement pensions, unemployment benefits and, in some countries, food stamps, given to the poor to buy food. Transfer payments do not reduce society's resources. They transfer purchasing power from one group of consumers, who pay taxes, to another group of consumers, who receive transfer payments.

The government budget balance

The government's budget balance is the difference between the government's revenues and its expenditures. A budget surplus occurs if government revenues exceed expenditures. A **budget deficit** occurs if government expenditures exceed

revenues. The minus sign is often omitted when reporting a deficit. If the **budget surplus** equals zero, we say the government has a **balanced budget**.

The national debt

The national debt is the sum of all past federal deficits, minus any surpluses. The national debt is usually taken as a percentage of GDP. If the percentage is over 70-80, the government is said to be in trouble.

Key concepts

- A **transfer payment** is the provision of aid or money to an individual who is not required to provide anything in exchange.
- A **budget surplus** occurs if government revenues exceed expenditures.
- A **budget deficit** occurs if government expenditures exceed revenues.
- The government's **budget balance** is the difference between the government's revenues and its expenditures.
- The **national debt** is the sum of all past federal deficits minus any surpluses

UNIT 9.2 The Use of Fiscal Policy to Stabilize the Economy

Learning objectives

1. Define automatic stabilizers and explain how they work.
2. Explain and illustrate graphically how discretionary fiscal policy works and compare the changes in aggregate demand that result from changes in government purchases, income taxes, and transfer payments.

Fiscal policy – the use of government expenditures and taxes to influence the level of economic activity – is the government counterpart to monetary policy. Like monetary policy, it can be used in an effort to close a recessionary or an inflationary gap.

Fiscal policy in practice

In the 1970s, there were campaigns for cutting government spending in many countries. The reason for it was that high levels of government spending were believed to exhaust resources that could be used productively in the private sector.

Lower incentives to work were also believed to result from social security payments and unemployment benefits.

However, trends often change. Tax burden may be raised when governments need to reduce the budget deficit or cut spending, for example, to encourage private investment after recessions.

The spending, tax, and transfer policies of local, state, and federal agencies affect aggregate demand and aggregate supply and thus affect the level of real GDP and the price level. An expansionary policy tends to increase real GDP. Such a policy could be used to close a recessionary gap. A contractionary fiscal policy tends to reduce real GDP. A contractionary policy could also be used to close an inflationary gap.

Government purchases of goods and services have a direct impact on aggregate demand. An increase in government purchases shifts the AD curve by the amount of the initial change in government purchases times the multiplier. Changes in personal income taxes or in the level of transfer payments affect DPI. They change consumption, though initially by less than the amount of the change in taxes or transfers. They thus cause somewhat smaller shifts in the AD curve than do equal changes in government purchases.

There are several issues in the use of fiscal policies for stabilization purposes. They include lags associated with fiscal policy, crowding out, the choice of which fiscal policy tool to use, and the possible burdens of accumulating national debt.

Automatic Stabilizers

Certain government expenditure and taxation policies tend to insulate individuals from the impact of shocks to the economy. Transfer payments have this effect. Because more people become eligible for income supplements when income is falling, transfer payments reduce the effect of a change in real GDP on DPI and thus help to insulate households from the impact of the change. Income taxes also have this effect. As incomes fall, people pay less in income taxes.

Any government program that tends to reduce fluctuations in GDP automatically is called an automatic stabilizer. Automatic stabilizers tend to increase GDP when it is falling and reduce GDP when it is rising.

To see how automatic stabilizers work, consider the decline in real GDP that occurred during the recession of 1990–1991. Real GDP fell 1.6%. The reduction in economic activity automatically reduced tax payments, reducing the impact of the downturn on DPI. Furthermore, the reduction in incomes increased transfer payment spending, boosting DPI further. Real DPI thus fell by only 0.9% during the 2001 recession, a much smaller percentage than the reduction in real GDP. Rising transfer payments and falling tax collections helped cushion households from the impact of the recession and kept real GDP from falling as much as it would have otherwise.

Automatic stabilizers have emerged as key elements of fiscal policy. The advantage of automatic stabilizers is suggested by their name. As soon as income starts to change, they go to work. Because they affect DPI directly, and because changes in DPI are closely linked to changes in consumption, automatic stabilizers act swiftly to reduce the degree of changes in real GDP.

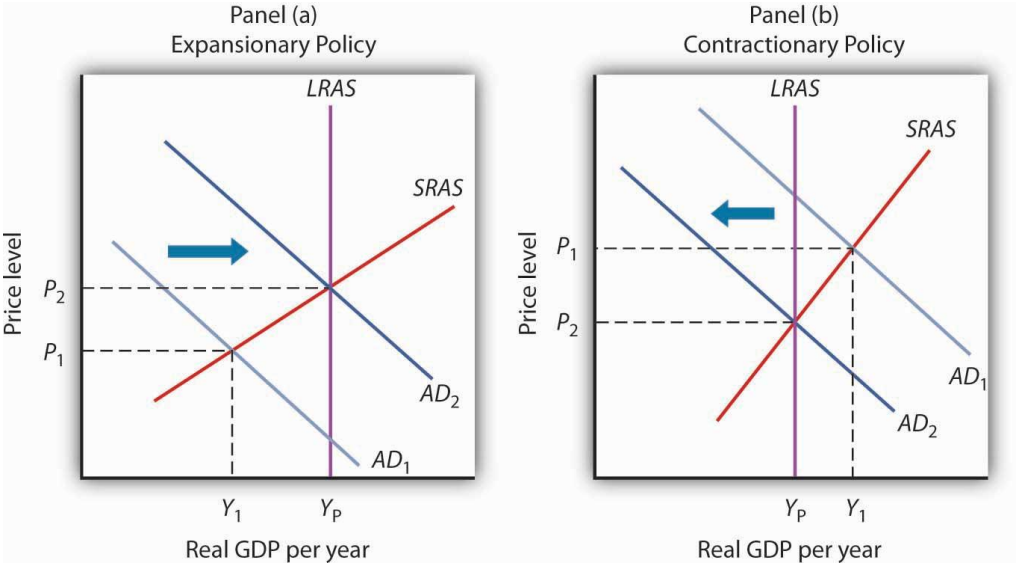
It is important to note that changes in expenditures and taxes that occur through automatic stabilizers do not shift the aggregate demand curve. Because they are automatic, their operation is already incorporated in the curve itself.

Discretionary Fiscal Policy Tools

As we begin to look at deliberate government efforts to stabilize the economy through fiscal policy choices, we note that most of the government's taxing and spending is for purposes other than economic stabilization. For example, the increase in defense spending in the early 1980s under President Ronald Reagan were undertaken primarily to promote national security. That the increased spending affected real GDP and employment was a by-product. The effect of such changes on real GDP and the price level is secondary, but it cannot be ignored. Our focus here, however, is on discretionary fiscal policy that is undertaken with the intention of stabilizing the economy.

Discretionary government spending and tax policies can be used to shift aggregate demand. **Expansionary fiscal policy** might consist of an increase in government purchases or transfer payments, a reduction in taxes, or a combination of these tools to shift the aggregate demand curve to the right. A **contractionary fiscal policy** might involve a reduction in government purchases or transfer payments, an increase in taxes, or a mix of all three to shift the aggregate demand curve to the left. Figure 9.2 *Expansionary and Contractionary Fiscal Policies to Shift Aggregate Demand* illustrates the use of fiscal policy to shift aggregate demand in response to a recessionary gap and an inflationary gap.

Figure 9.2 *Expansionary and Contractionary Fiscal Policies to Shift Aggregate Demand*



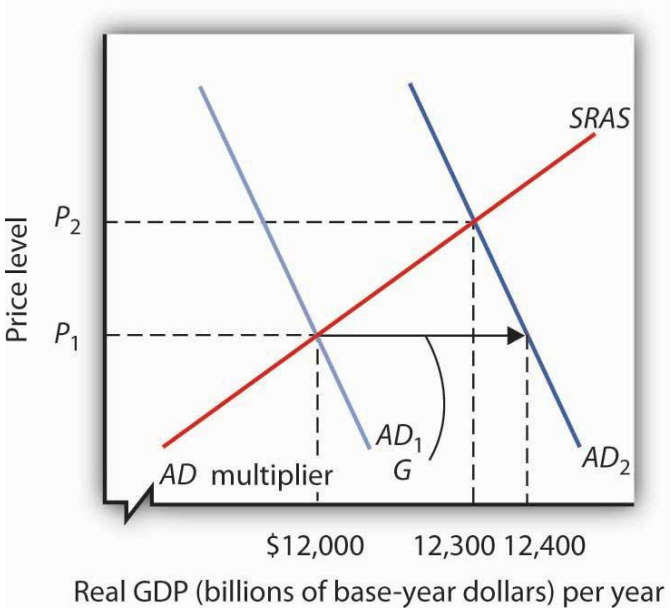
In Panel (a), the economy produces a real GDP of Y_1, which is below its potential level of *Y*p. An expansionary fiscal policy seeks to shift aggregate demand to *AD*2 in order to close the gap. In Panel (b), the economy initially has an inflationary gap at Y_1. A contractionary fiscal policy seeks to reduce aggregate demand to AD_2 and close the gap.

Changes in Government Purchases

One policy through which the government could seek to shift the aggregate demand curve is a change in government purchases. Figure 9.3 *An Increase in Government Purchases* shows the effect of an increase in government purchases of

$200 billion. The initial price level is *P*1 and the initial equilibrium real GDP is $12,000 billion. Suppose the multiplier is 2. The $200 billion increase in government purchases increases the total quantity of goods and services demanded, at a price level of P_1, by $400 billion (the $200 billion increase in government purchases times the multiplier) to $12,400 billion. The aggregate demand thus shifts to the right by that amount to AD_2. The equilibrium level of real GDP rises to $12,300 billion, and the price level rises to P_2.

Figure 9.3 *An Increase in Government Purchases*



A reduction in government purchases would have the opposite effect. The AD curve would shift to the left by an amount equal to the initial change in government purchases times the multiplier. Real GDP and the price level would fall.

Changes in Income Taxes

Income taxes affect the consumption component of aggregate demand. An increase in income taxes reduces DPI and thus reduces consumption (but by less than the change in DPI). That shifts the AD curve leftward by an amount equal to the initial change in consumption that the change in income taxes produces times the multiplier. A reduction in income taxes increases DPI, increases consumption (but by less than the change in DPI), and increases aggregate demand.

Suppose, for example, that income taxes are reduced by $200 billion. Only some of the increase in DPI will be used for consumption and the rest will be saved.

Suppose the initial increase in consumption is $180 billion. Then the shift in the AD curve will be a multiple of $180 billion; if the multiplier is 2, AD will shift to the right by $360 billion. Thus, as compared to the $200-billion increase in government purchases that we saw in Figure *An Increase in Government Purchases*, the shift in the AD curve due to an income tax cut is somewhat less, as is the effect on real GDP and the price level.

Changes in Transfer Payments

Changes in transfer payments, like changes in income taxes, alter the DPI of households and thus affect their consumption, which is a component of aggregate demand. A change in transfer payments will thus shift the AD curve because it will affect consumption. Because consumption will change by less than the change in DPI, a change in transfer payments of some amount will result in a smaller change in real GDP than would a change in government purchases of the same amount. As with income taxes, a $200-billion increase in transfer payments will shift the AD curve to the right by less than the $200-billion increase in government purchases that we saw in Figure *An Increase in Government Purchases*.

Key concepts

- **Discretionary fiscal policy** may be either expansionary or contractionary.
- A change in government purchases shifts the aggregate demand curve at a given price level by an amount equal to the initial change in government purchases times the multiplier. The change in real GDP, however, will be reduced by the fact that the price level will change.
- A change in income taxes or government transfer payments shifts the aggregate demand curve by a multiple of the initial change in consumption (which is less than the change in personal disposable income) that the change in income taxes or transfer payments causes. Then, the change in real GDP will be reduced by the fact that the price level will change.
- A change in government purchases has a larger impact on the aggregate demand curve than does an equal change in income taxes or transfers.

Chapter 9. A Multiple Choice Test

1. If a tax rate increases with an increase in incomes, such a tax is called:

a) direct;

b) regressive;

c) progressive;

d) indirect.

2. Which of the fiscal policies will contribute to the reduction of the budget deficit?

a) a reduction in taxes collected and transfer payments.

b) an increase in the amount of taxes collected and a decrease in the amount of transfer payments.

c) an increase in the interest rate and a reduction of reserve requirements;

d) an increase in the amount of taxes collected and the amount of transfer payments.

3. The taxes are called regressive if the average tax rate:

a) increases with income;

b) does not change when incomes change;

c) decreases with increasing income;

d) increases with the GDP.

4. If the total revenues is 1,059 trillion rubles, and the public spending is 1,151 trillion rubles, then the country will experience:

a) budget deficit, and a decrease in the exports;

b) budget deficit and the growth in the public debt;

c) budget surplus and the growth in the public debt;

d) budget surplus and a decrease in the public debt.

5. Keynesianism as an economic theory states that:

a) the market economy itself does not ensure the full use of its resources;

b) the satisfaction of the needs of society in goods and services is a spontaneous process;

c) the economy is more efficient if it is not regulated by the government;

d) the private sector of the economy gives the greatest economic effect.

6. A country's government runs a budget deficit when which of the following occurs in a given year?

a) The amount of new loans to developing nations exceeds the amount of loans paid off by developing nations.

b) Government spending exceeds tax revenues.

c) The debt owed to foreigners exceeds the debt owed to the country's citizens.

d) The amount borrowed exceeds the interest payment on the national debt.

7. Which of the following combinations of changes in government spending and taxes is necessarily expansionary?

Government Spending	Taxes
a) Increase	Increase
b) Increase	Decrease
c) Decrease	Not change
e) Decrease	Decrease

8.Which of the three statements is correct?

a)Governments systematically issue bonds to finance public spending.

b)Governments issue bonds to finance public spending when necessary.

c)Governments or central banks regularly issue bonds to increase the money supply

9. What happens to the national debt in any of the events?

a) There is a budget surplus.

b) There is a budget deficit.

c) There is a decrease in a surplus.

d) The deficit decreases.

10. Suppose the economy has a recessionary gap. What fiscal policies might be used to close the gap?

Numerical tasks. Write an appropriate equation and use it to compute the answer.

1. **Tax reduction and DPI:** Let us assume that the government engages in expansionary fiscal policy by decreasing tax rates by 5%, which is expected to reduce total tax volume by $300 billion. How will disposable income change?

2. **Tax reduction and consumption:** Assume that the total tax volume reduced by $300 billion and the marginal propensity to consume (MPC) equals 0.8. How much more will households spend due to the tax reduction?

3. **Tax reduction and multiplier:** The first-round of increase in consumption of $240 billion (task 2) will trigger a second round of increase in disposable income of the same amount. 1) How much more will households spend in the second-round of consumption taking into account that the MPC equals 0.8.?

4. **Budget deficit or surplus:** The total revenues of the state budget for the year is 1,059 trillion rubles and spending is 1,151 trillion rubles. Does the government face budget deficit or budget surplus and how much? How will it affect the country's public debt?

5. **Multiplier of government purchases:** The government increased government purchases by 25 billion money units. As a result, the national income increased by 100 billion money units. Compute a multiplier of government purchases.

6. **GDP and multiplier:** The multiplier of government purchases equals 2. How will the GDP change when the government decreases purchases by 200 million?

7. **Government purchases, AD and real GDP:** Suppose a country increases government purchases by $100 billion. Suppose the multiplier is 1.5 and the economy's real GDP is $5,000 billion. In which direction will the AD curve shift and by how much? Explain using a graph why the change in real GDP is likely to be smaller than the shift in the AD curve.

8. **Taxation, AD and real GDP:** Suppose a country decreases income taxes by $100 billion, and this leads to an increase in consumption spending of $90 billion. Suppose the multiplier is 1.5 and the economy's real GDP is $5,000 billion. In which direction will the AD curve shift and by how much? Explain using a graph why the change in real GDP is likely to be smaller than the shift in the AD curve.

CHAPTER 10. AN OPEN ECONOMY

UNIT 10.1 The Balance of Payments

Learning objectives

1. Define a country's balance of payments and balance of trade
2. Explain what is included in the current and capital accounts.

A country's **balance of payments** is a record of all the flows of money between residents of that country and the rest of the world. Receipts of money from abroad are regarded as credits and are entered in the accounts with a positive sign. Outflows of money from the country are regarded as debits and are entered with a negative sign.

There are four main parts of the balance of payments account: the *current account,* the *capital account* and the *financial account.* Each part is then subdivided. We shall look at each part in turn, and use the UK' simplified balance of payments as an example given in Table 10.1 *UK balance of payments.*

CURRENT ACCOUNT

The current account records payments for imports and exports of goods and services, plus incomes flowing into and out of the country, plus net transfers of money into and out of the country. It is normally divided into four subdivisions.

1.Trade in goods

This records imports and exports of physical goods (previously known as 'visibles'). Exports result in an inflow of money and are therefore a credit item. Imports result in an outflow of money and are therefore a debit item. The balance of these is called the balance on trade in goods or balance of visible trade or merchandise balance.

2.Trade in services

This records imports and exports of services (such as transport, tourism and insurance"). Thus the purchase of a foreign holiday would be a debit, since it represents an outflow of money, whereas the purchase by an overseas resident of a UK insurance policy would be a credit to the UK services account. The balance of these is called the services balance. The balance of both the goods and services

accounts together is known as the balance of trade. In other words, the **balance of trade** is the difference between the value of a country's imports and exports for a given period and is the largest component of a country's balance of payments. A s**urplus** is when exports exceed imports. A **deficit** is when imports exceed exports.

3.Net income flows

These consist of wages, interest and profits flowing into and out of the country. For example, dividends earned by a foreign resident from shares in a UK company would be an outflow of money (a debit item).

4.Net current transfers of money

These include government contributions to and receipts from the EU and international organisations, and international transfers of money both by private individuals and firms. Transfers out of the country are debits. Transfers into the country (e.g. money sent from Greece to a Greek student studying in the UK) would be a credit item.

The current account balance is the overall balance of all the above four subdivisions. When the balance on current account is positive, spending flowing in for the purchase of goods and services exceeds spending that flows out, and the economy has a current account surplus (i.e. net exports are positive in our simplified analysis). When the balance on current account is negative, spending for goods and services that flows out of the country exceeds spending that flows in, and the economy has a current account deficit (i.e. net exports are negative in our simplified analysis). In other words, a **current account surplus** is where credits exceed debits. A **current account deficit** is where debits exceed credits.

CAPITAL ACCOUNT

5.Net capital transfers, etc.

The capital account records the flows of funds, into the country (credits) and out of the country (debits), associated with the acquisition or disposal of fixed assets (e.g. land), the transfer of funds by migrants, and the payment of grants by the government for overseas projects and the receipt of EU money for capital projects (e.g. from the Agricultural Guidance Fund).

A country's capital account is an accounting statement of spending flows into and out of the country during a particular period for purchases of assets. The term within the parentheses on the right side of the equation gives the balance between rest-of-world purchases of domestic assets and domestic purchases of rest-of-world assets; this balance is a country's balance on capital account.

A positive balance on capital account is a **capital account surplus**. A capital account surplus means that buyers in the rest of the world are purchasing more of a country's assets than buyers in the domestic economy are spending on rest-of-world assets. A negative balance on capital account is a **capital account deficit**. It implies that buyers in the domestic economy are purchasing a greater volume of assets in other countries than buyers in other countries are spending on the domestic economy's assets.

FINANCIAL ACCOUNT

6. Investment

The financial account of the balance of payments records cross border changes in the holding of shares, property, bank deposits and loans, government securities, etc. In other words, unlike the current account, which is concerned with money incomes, the financial account is concerned with the purchase and sale of financial assets in the form of direct investment, portfolio investment and other financial flows.

- Direct investment. If a foreign company invests money from abroad in one of its branches or associated companies in the UK, this represents an inflow of money when the investment is made and is thus a credit item. (Any subsequent profit from this investment that flows abroad will be recorded as an investment income outflow on the current account.) Investment abroad by UK companies represents an outflow of money when the investment is made. It is thus a debit item.
- Portfolio investment. This is changes in the holding of paper assets, such as company shares. Thus if a UK resident buys shares in an overseas company, this is an outflow of funds and is hence a debit item.

7. Other financial flows (mainly short-term)

These consist primarily of various types of short-term monetary movement between the UK and the rest of the world. Deposits by overseas residents in banks in the UK and loans to the UK from abroad are credit items, since they represent an inflow of money. Deposits by UK residents in overseas banks and loans by UK banks to overseas residents are debit items. They represent an outflow of money. Short-term monetary flows are common between international financial centers to take advantage of differences in countries' interest rates and changes in exchange rates.

8. Flows to and from the reserves.

The UK, like all other countries, holds reserves of gold and foreign currencies. From time to time the Bank of England (acting as the government's agent) will sell some of these reserves to purchase pounds of sterling on the foreign exchange market. It does this normally as a means of supporting the rate of exchange. Drawing on reserves represents a *credit* item in the balance of payments accounts: money drawn from the reserves represents an *inflow* to the balance of payments (albeit an outflow from the reserves account). The reserves can thus be used to support a deficit elsewhere in the balance of payments.

Conversely, if there is a surplus elsewhere in the balance of payments, a country's central bank can use it to build up the reserves. Building up the reserves counts as a debit item in the balance of payments, since it represents an outflow from it (to the reserves).

Figure 10.1 *UK balance of payments* (simplified)

Current account	£ million
1.Trade in goods	
(a) Exports of goods	+210,182
(b) Imports of goods	- 275,813
Balance on trade in goods	- 65,631
2.Trade in services	
(a) Exports of services	+105,732
(b) Imports of services	- 86,998
Balance on trade in services	+18,734
Balance on trade in goods and services	- 46,897
3. Net income flows (wages and investment	+27,408

income)	
4. Net current transfers (government and private)	- 12,401
Current account balance	**- 31,890**
Capital account	
5. Net capital transfers, etc:	+2,301
Capital account balance	**+2,301**
Financial account	
6.Investment(direct and portfolio)	
(a) Net investment in UK from abroad	+221,626
(b) Net UK investment abroad	- 219,293
Balance of direct and portfolio investment	+2,333
7. Other financial flows (mainly short-term)	
(a) Net deposits in UK from abroad and borrowing from abroad by UK residents	+523,673
(b) Net deposits abroad by UK residents and UK lending to overseas residents	- 500,539
Balance of other financial flows	+23,134
8. Reserves (drawing on+ adding to-)	
Financial account balance	**+24,811**
Total of all three accounts	**- 4,788**
9. Net errors and omissions	+4,788
	0

9. Net errors and omissions

When all the components of the balance of payments are taken together, the balance of payments should exactly balance: credits should equal debits. If they were not equal, the rate of exchange would have to adjust until they were, or the government would have to intervene to make them equal.

When the statistics are compiled, however, a number of errors are likely to occur. As a result there will not be a balance. To 'correct' for this, a net errors and omissions item is included in the accounts. This ensures that there will be an exact balance. The main reason for the errors is that the statistics are obtained from a

number of sources, and there are often delays before items are recorded and sometimes omissions.

In our case,

- current account balance = –31,890m pounds
- capital account balance = +2,301m pounds
- financial account balance = +24,811m pounds

Total of all three = –4,788m pounds, which is not 'zero' as it is to be. Why? When the statistics are compiled, a number of errors are likely to occur. As a result, there will not be a balance. To 'correct' this, a net errors and omissions item is included in the accounts (+4,788m pounds). This ensures that there will be an exact balance.

UNIT 10.2 Foreign Exchange Markets

A financial market that influences macroeconomic variables is the **foreign exchange market**, a market in which currencies of different countries are traded for one another. Since changes in exports and imports affect aggregate demand and thus real GDP and the price level, the market in which currencies are traded has tremendous importance in the economy.

In general, exchange rates are determined by demand and supply in the FOREX market and that the markets for the currencies of most nations can be regarded as being in equilibrium. Exchange rates adjust quickly, so that the quantity of a currency demanded equals the quantity of the currency supplied.

Quantity of currency demanded = quantity of currency supplied

In turn, the quantity of a currency demanded is from two sources:

1. Exports;
2. Rest-of-world purchases of domestic assets.

The quantity supplied of a currency is also from two sources:

1. Imports;
2. Domestic purchases of rest-of-world assets.

Therefore, we can rewrite the equation as

Exports + (rest-of-world purchases of domestic assets) = imports +
(domestic purchases of foreign assets)

Foreigners who want to purchase goods and services or assets in the United States must typically pay for them with dollars. United States purchasers of foreign goods must generally make the purchase in a foreign currency. An Egyptian family, for example, exchanges Egyptian pounds for dollars in order to pay for admission to Disney World. A German financial investor purchases dollars to buy U.S. government bonds. A family from the United States visiting India, on the other hand, needs to obtain Indian rupees in order to make purchases there. A U.S. bank wanting to purchase assets in Mexico City first purchases pesos. These transactions are accomplished in the foreign exchange market.

The foreign exchange market is not a single location in which currencies are traded. The term refers instead to the entire array of institutions through which people buy and sell currencies. It includes a hotel desk clerk who provides currency exchange as a service to hotel guests, brokers who arrange currency exchanges worth billions of dollars, and governments and central banks that exchange currencies. Major currency dealers are linked by computers so that they can track currency exchanges all over the world.

The Exchange Rate

A country's exchange rate is the price of its currency in terms of another currency or currencies. On March 26, 2019, for example, the dollar traded for 64.40 RUB, and the euro for 72.51 RUB. There are as many exchange rates for the dollar as there are countries whose currencies exchange for the dollar – roughly 200 of them.

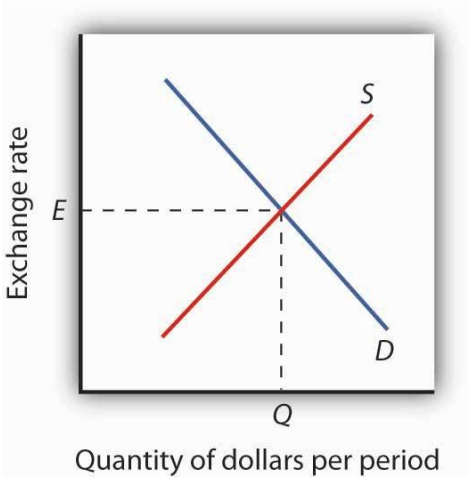
Determining Exchange Rates

The rates at which most currencies exchange for one another are determined by demand and supply. How does the model of demand and supply operate in the foreign exchange market?

The demand curve for dollars relates the number of dollars buyers want to buy in any period to the exchange rate. An increase in the exchange rate means it takes more foreign currency to buy a dollar. A higher exchange rate, in turn, makes U.S.

goods and services more expensive for foreign buyers and reduces the quantity they will demand. That is likely to reduce the quantity of dollars they demand. Foreigners thus will demand fewer dollars as the price of the dollar – the exchange rate – rises. Consequently, the demand curve for dollars is downward sloping, as in Figure *Determining an Exchange Rate*.

Figure 10.2 *Determining an Exchange Rate*



The supply curve for dollars emerges from a similar process. When people and firms in the United States purchase goods, services, or assets in foreign countries, they must purchase the currency of those countries first. They supply dollars in exchange for foreign currency. The supply of dollars on the foreign exchange market thus reflects the degree to which people in the United States are buying foreign money at various exchange rates. A higher exchange rate means that a dollar trades for more foreign currency. In effect, the higher rate makes foreign goods and services cheaper to U.S. buyers, so U.S. consumers will purchase more foreign goods and services. People will thus supply more dollars at a higher exchange rate; we expect the supply curve for dollars to be upward sloping, as suggested in Figure *Determining an Exchange Rate*.

In addition to private individuals and firms that participate in the foreign exchange market, most governments participate as well. A government might seek to lower its exchange rate by selling its currency; it might seek to raise the rate by buying its currency. Although governments often participate in foreign exchange

markets, they generally represent a very small share of these markets. The most important traders are private buyers and sellers of currencies.

Purchasing Power Parity

According to the Purchasing Power Parity, the nominal exchange rate between the currencies of two countries must reflect the price level in those countries. In other words, a unit of a currency must have the same real value in every country. At home, the price level is *P*, so the purchasing power of $1 at home is 1/P. A dollar can buy 1/P quantity of goods.

Abroad, the nominal exchange rate is e => $1=e units of foreign currency. The price level is P*, so the purchasing power e/P*. For the purchasing power of $1 to be the same in the two countries, according to the Purchasing Power Parity, 1/P = e/P*. 1=eP/P* +> a constant real exchange rate.

Exchange Rates and Macroeconomic Performance

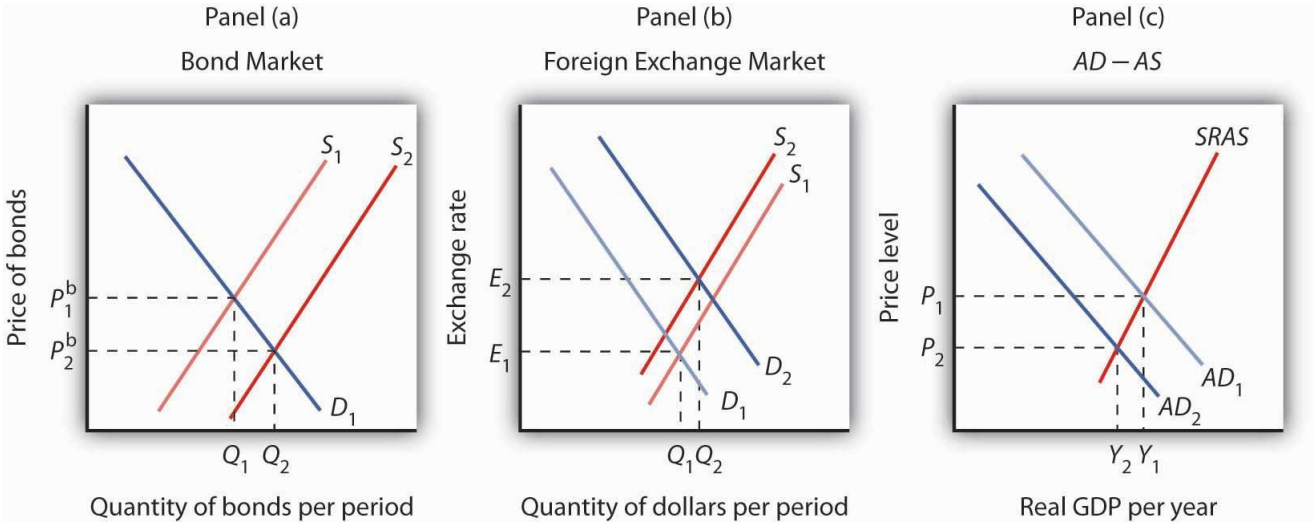
People purchase a country's currency for two quite different reasons: to purchase goods or services in that country, or to purchase the assets of that country – its money, its capital, its stocks, its bonds, or its real estate. Both of these motives must be considered to understand why demand and supply in the foreign exchange market may change.

One thing that can cause the price of the dollar to rise, for example, is a reduction in bond prices in American markets. Figure 10.3 *Shifts in Demand and Supply for Dollars on the Foreign Exchange Market* illustrates the effect of this change.

Suppose the supply of bonds in the U.S. bond market increases from S_1 to S_2 in Panel (a). Bond prices will drop. Lower bond prices mean higher interest rates. Foreign financial investors, attracted by the opportunity to earn higher returns in the United States, will increase their demand for dollars on the foreign exchange market in order to purchase U.S. bonds. Panel (b) shows that the demand curve for dollars shifts from D_1 to D_2. Simultaneously, U.S. financial investors, attracted by the higher interest rates at home, become less likely to make financial investments abroad and thus supply fewer dollars to exchange markets. The fall in the price of U.S. bonds

shifts the supply curve for dollars on the foreign exchange market from S_1 to S_2, and the exchange rate rises from E_1 to E_2.

Figure 10.3 *Shifts in Demand and Supply for Dollars on the Foreign Exchange Market*



The higher exchange rate makes U.S. goods and services more expensive to foreigners, so it reduces exports. It makes foreign goods cheaper for U.S. buyers, so it increases imports. Net exports thus fall, reducing aggregate demand. Panel (c) shows that output falls from Y_1 to Y_2; the price level falls from P_1 to P_2. This development in the foreign exchange market reinforces the impact of higher interest rates we observed earlier in Figure 4.4 *Bond Prices and Macroeconomic Activity* in Unit 4, Panels (c) and (d). They not only reduce investment – they reduce net exports as well.

To sum up, in in Figure 10.3, Panel (a), an increase in the supply of bonds lowers bond prices to Pb_2 (and thus raises interest rates). Higher interest rates boost the demand and reduce the supply for dollars, increasing the exchange rate in Panel (b) to E_2. These developments in the bond and foreign exchange markets are likely to lead to a reduction in net exports and in investment, reducing aggregate demand from AD_1 to AD_2 in Panel (c). The price level in the economy falls to P_2, and real GDP falls from Y_1 to Y_2.

Key concepts

- The demand for dollars on foreign exchange markets represents foreign demand for U.S. goods, services, and assets. The supply of dollars on foreign

exchange markets represents U.S. demand for foreign goods, services, and assets. The demand for and the supply of dollars determine the exchange rate.

- A rise in U.S. interest rates will increase the demand for dollars and decrease the supply of dollars on foreign exchange markets. As a result, the exchange rate will increase and aggregate demand will decrease. A fall in U.S. interest rates will have the opposite effect.

UNIT 10.3 Exchange Rates and the Public Policies

1. No government or central bank intervention

In a free foreign exchange market, the balance of payments will automatically balance. The credit side of the balance constitutes the demand for the currency: e.g. if foreigners buy another country's exports, they demand that country's currency in order to pay for them.

The debit side of the balance constitutes the supply of the currency: e.g. when the country's residents buy foreign goods, the importers of them require foreign currency to pay for them. So they supply the country's money in the FX markets. Thus credits on the balance of payments are equal to the debits.

2. With government or central bank intervention

The government or central bank may intervene in the foreign exchange market as they may be unwilling to let the country's currency float freely. The main reason for this is that frequent changes in the exchange rate cause uncertainty for businesses, which might reduce their trade and investment.

Reducing short-term fluctuations

Using reserves: Central Bank sells gold and foreign currencies from the reserves and buys national currency, which influences supply and demand.

Borrowing from abroad: The government gets a foreign currency loan and the Central Bank uses it to buy national currency, which again influences supply and demand.

Raising interest rates: Central Bank raises interest rates and people deposit money in the country, which influences supply and demand.

Maintaining a fixed rate of exchange over the long term.

Possible methods:

- Contractionary policies (fiscal and/or monetary policies);
- Supply-side policies;
- Controls on imports and/or foreign exchange dealing.

Contractionary policies

The government deliberately reduces aggregate demand by either fiscal policy or monetary policy or both. Contractionary fiscal policy: to increase taxes and/or to decrease government spending. Contractionary monetary policy: to decrease the supply of money and/or to increase interest rates.

A reduction in aggregate demand works in two ways:

- Level of consumer spending decreases → imports decrease → the supply of the national currency in FX market decrease.
- As a result, the rate of inflation decreases → domestic goods become more competitive abroad → the demand for national currency increases. Also imports decrease as consumers switch to the now more competitive home-produced goods → the supply of national currency in FX market decreases.

Supply-side policies

The government attempts to increase the long-term competitiveness of domestically produced goods by encouraging reductions in the costs of production and/or improvements in the quality of home-made goods.

Controls on imports and/or foreign exchange dealing

The government restricts the outflow of money, either by restricting people's access to foreign exchange, or by the use of tariffs (customs duties) and quotas.

Key concepts

- The balance of payments shows spending flowing into and out of a country.

- The current account is an accounting statement that includes all spending flows across a nation's border except those that represent purchases of assets. In our simplified analysis, the balance on current account equals net exports.
- A nation's balance on capital account equals rest-of-world purchases of its assets during a period less its purchases of rest-of-world assets.

Chapter 10. A Multiple Choice Test and Tasks

1. Exchange rates: Which of the following is likely to occur following the depreciation of the United States dollar?

a) United States imports will increase.

b) United States exports will increase.

c) Demand for the United States dollar will decrease.

d) United States goods will become more expensive in foreign markets

2. Exchange rates: The value of a country's currency will tend to appreciate if

a) demand for the country's exports increases

b) the country's money supply increases

c) the country's citizens increase their travel abroad

d) domestic interest rates decrease

3. Exchange rates: A 10% depreciation in the value of a country's currency internationally causes the volume of its imports to fall by 10% and the volume of its exports to increase by 15%. The overall effect of these changes, other things unchanged, will be:

a) a deterioration in the country's balance of trade;

b) an improvement in the country's balance of trade;

c) an increase in the AD;

d) a decrease in the AD.

4. Balance of payments: Which of the following are included as invisible items on the current account of the balance of payments?

a) spending on souvenirs by foreign tourists;

b) machines sold abroad;

c) returns on investment made in a foreign country by a resident in this country.

d) Government grant to a developing country.

Numerical and graphic tasks

1. Purchasing Power Parity: Suppose a Starbucks latte costs $4.00 in the USA and 3.20 euros in the Euro area. Also, suppose a McDonald's Big Mac costs $4.40 in the USA and 5.5 euros in the Euro zone. If the nominal exchange rate is 0.80 euros per dollar, the prices of which of the goods have prices consistent with purchasing power parity?

2. Purchasing Power Parity: Some time ago two cars of the same quality – Russian and American - cost 210 thousand rubles and 10 thousand dollars respectively. If the nominal exchange rate of the US currency was 30 RUB/USD at that time, would the prices of the cars be consistent with purchasing power parity?

3. The bond and the Forex market: Suppose the supply of bonds in the U.S. market decreases. Show graphically and explain the effects on the bond market (Panel a) and FOREX market (Panel b). Use the AD-AS graphic model to show and explain the effects on investment, net exports, real GDP, and the price level.

THE GENERAL MULTIPLE CHOICE PRACTICE TEST

Select the option which is best in each case.

1. A country's government runs a budget deficit when which of the following occurs in a given year?
   (A) The amount of new loans to developing nations exceeds the amount of loans paid off by developing nations.
   (B) Government spending exceeds tax revenues.
   (C) The debt owed to foreigners exceeds the debt owed to the country's citizens.
   (D) The amount borrowed exceeds the interest payment on the national debt.
   (E) Interest payments on the national debt exceed spending on goods and services.
2. The transaction demand for money is very closely associated with money's use as a
   (A) store of value
   (B) standard unit of account
   (C) measure of value
   (D) medium of exchange
   (E) standard of deferred payment
3. Unlike a market economy, a command economy uses
   (A) more centralized planning in economic decision making
   (B) consumer sovereignty to make production decisions
   (C) its resources more efficiently
   (D) price signals in economic decision making
   (E) the popular vote in making resource allocation decisions
4. The value of a country's currency will tend to appreciate if
   (A) the country's citizens increase their travel abroad
   (B) the country's money supply increases
   (C) demand for the country's exports increases
   (D) domestic interest rates decrease
   (E) tariffs on the country's imports decrease

5. Which of the following best illustrates an improvement in a country's standard of living?

(A) An increase in real per capita gross domestic product

(B) An increase in nominal per capita gross domestic product

(C) Price stability

(D) A balanced budget

(E) An increase in the consumer price index

6. Hyperinflation is typically caused by

(A) high tax rates that discourage work effort

(B) continuous expansion of the money supply to finance government budget deficits

(C) trade surpluses that are caused by strong protectionist policies

(D) bad harvests that lead to widespread shortages

(E) a large decline in corporate profits that leads to a decrease in production

7. All of the following changes will shift the investment demand curve to the right EXCEPT

(A) a decrease in the corporate income tax rate

(B) an increase in the productivity of new capital goods

(C) an increase in the real interest rate

(D) an increase in corporate profits

(E) an increase in real gross domestic product

8. The official unemployment rate understates the unemployment level in the economy because the official unemployment rate

(A) ignores the duration of unemployment

(B) ignores underemployed and discouraged workers

(C) includes jobs created by the underground economy

(D) excludes all unemployed teenagers

(E) excludes frictionally unemployed workers

9. If a reduction in aggregate supply is followed by an increase in aggregate demand, which of the following will definitely occur?

(A) Output will increase.

(B) Output will decrease.

(C) Output will not change.

(D) The price level will increase.

(E) The price level will decrease.

10. Which of the following combinations of changes in government spending and taxes is necessarily expansionary?

Government Spending	Taxes
(A) Increase	Increase
(B) Increase	Decrease
(C) Decrease	Not change
(D) Decrease	Increase
(E) Decrease	Decrease

11. The amount of money that the public wants to hold in the form of cash will

(A) be unaffected by any change in interest rates or the price level

(B) increase if interest rates increase

(C) decrease if interest rates increase

(D) increase if the price level decreases

(E) decrease if the price level remains constant

12. For an economy consisting of households and businesses only, which of the following is consistent with the circular flow of income and production?

(A) Households are producers of goods and services and consumers of resources.

(B) Households are users of resources, and businesses are sources of saving.

(C) Households are suppliers of resources and consumers of goods and services.

(D) Businesses are users of taxes, and households are sources of taxes.

(E) Businesses are suppliers of resources and consumers of goods and services.

13. With an increase in the real interest rate, consumption and real gross domestic product will most likely change in which of the following ways?

Consumption	Real Gross Domestic Product

(F) Increase Increase

(G) Increase Decrease

(H) Decrease Increase

(I) Decrease Decrease

(J) No change Increase

14. According to the short-run Phillips curve, lower inflation rates are associated with

(A) higher unemployment rates

(B) higher government spending

(C) larger budget deficits

(D) greater labor-force participation rates

(E) smaller labor-force participation rates

15. Which of the following will lead to a decrease in a nation's money supply?

(A) A decrease in income tax rates

(B) A decrease in the discount rate

(C) An open market purchase of government securities by the central bank

(D) An increase in reserve requirements

(E) An increase in government expenditures on goods and services

16. An increase in which of the following would cause the AD curve to shift to the left?

(A) Consumer optimism

(B) Population

(C) Cost of resources

(D) Income taxes

(E) Net exports

17. If all prices doubled, which of the following would be true?

(A) real income have halved

(B) the price index will double

(C) the proportion of income is unchanged

(D) nominal income have doubled

(E) real income increases

18. With an upward-sloping SRAS curve, an increase in government expenditure will most likely

(A) reduce the price level

(B) reduce the level of nominal gross domestic product

(C) increase real gross domestic product

(D) shift the short-run aggregate supply curve to the right

(E) shift both the aggregate demand curve and the long-run aggregate supply curve to the left

19. In the short run, an expansionary monetary policy would most likely result in which of the following changes in the price level and real gross domestic product (GDP) ?

Price Level	Real GDP
(A) Decrease	Increase
(B) No change	Decrease
(C) Increase	No change
(D) Increase	Decrease
(E) Increase	Increase

20. Which of the following is likely to occur following the depreciation of the United States dollar?

(A) United States imports will increase.

(B) United States exports will increase.

(C) Demand for the United States dollar will decrease.

(D) United States demand for foreign currencies will increase.

(E) United States goods will become more expensive in foreign markets

21. Which of the following individuals is considered officially unemployed?

(A) Chris, who has not worked for more than three years and has given up looking for work

(B) Kim, who is going to school full-time and is waiting until graduation before looking for a job

(C) Pat, who recently left a job to look for a different job in another town

(D) Leslie, who retired after turning 65 only five months ago

(E) Lee, who is working 20 hours per week and is seeking full-time employment

22. An increase in net investment leads to faster economic growth because capital per worker and output per worker will change in which of the following ways?

Capital per Worker	Output per Worker
(A) Increase	Increase
(B) Increase	Decrease
(C) No change	Increase
(D) Decrease	Increase
(E) Decrease	Decrease

23. A commercial bank's ability to create money depends on which of the following?

(A) The existence of a central bank

(B) A reserve banking system

(C) Gold or silver reserves backing up the currency

(D) A large national debt

(E) The existence of both checking accounts and savings accounts

24. The consumer price index (CPI) is designed to measure changes in the

(A) spending patterns of urban consumers only

(B) spending patterns of all consumers

(C) wholesale price of manufactured goods

(D) prices of all goods and services produced in an economy

(E) cost of a selected market basket of goods and services

25. In the short run, which of the following would occur to bond prices and interest rates if a central bank bought bonds through open-market operations?

Bond Prices	Interest Rates
(A) No change	Increase

(B) Increase Increase

(C) Increase Decrease

(D) Decrease Increase

(E) Decrease Decrease

26. The diagram above shows the production possibilities curve for an economy that produces only consumption and capital goods. All of the following statements about this economy are true EXCEPT:

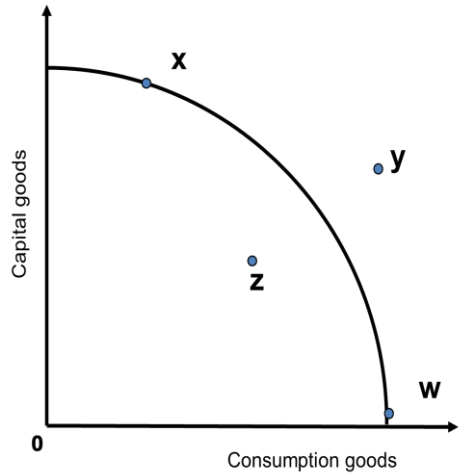
(A) Producing at point Z results in the underutilization of resources.

(B) The combination represented by point Y is unattainable, given the scarcity of resources.

(C) Resources are fully utilized at points W and X.

(D) Producing at point X will result in greater economic growth than will producing at point W.

(E) Point X represents the most efficient combination of the two goods that can be produced by this economy.



27. The shifting of a country's production possibilities curve to the right will most likely cause

(A) net exports to decline

(B) inflation to increase

(C) the aggregate demand curve to shift to the left

(D) the long-run aggregate supply curve to shift to the left

(E) the long-run aggregate supply curve to shift to the right

28. An increase in which of the following would LEAST likely increase labor productivity?

(A) Physical capital

(B) Human capital

(C) Technological improvements

(D) Educational achievement

(E) The labor force

29. In the narrowest definition of money, M1, savings accounts are excluded because they are

(A) not a medium of exchange

(B) not insured by federal deposit insurance

(C) available from financial institutions other than banks

(D) a store of purchasing power

(E) interest-paying accounts

30. Which of the following changes in the supply of and the demand for a good will definitely result in a decrease in both the equilibrium price and quantity of the good?

Supply	Demand
a) Increase	Increase
b) Increase	No change
c) No change	Decrease
d) Decrease	Increase

DEFINITIONS OF THE KEY CONCEPTS

Gross Domestic Product (**GDP)** is the total value of all final goods and services produced in the country during a particular period.

Double counting refers to the faulty practice of counting the value of a nation's output more than once. Since goods are produced in stages, many intermediate goods are used to produce a final good. This problem is solved by value added method.

Nominal GDP is the value of goods and services for a particular period, valued in terms of prices for that period.

Real GDP is an inflation-adjusted measure that reflects the value of all final goods and services produced by an economy in a given year (expressed in base-year prices). Real GDP is calculated by dividing nominal GDP over an implicit price deflator.

Implicit Price Deflator is a price index for all final goods and services produced. It is the ratio of nominal GDP to the real GDP. It is sometimes called the Paasche index or a Deflator):

$$P_P = \frac{\sum(p_{c,t_n}) * (q_{c,t_n})}{\sum(p_{c,t_0}) * (q_{c,t_n})}$$

Personal consumption is a flow variable that measures the value of goods and services purchased by households during a time period. Purchases by households of groceries, health-care services, clothing, and automobiles—all are counted as consumption. Personal consumption represents a demand for goods and services placed on firms by households.

Gross private domestic investment is the value of all goods produced during a period for use in the production of other goods and services. It includes three flows that add to or maintain the nation's capital stock: expenditures by business firms on new buildings, plants, tools, equipment, and software that will be used in the production of goods and services; expenditures on new residential housing; and changes in business inventories.

Government purchases are the sum of purchases of goods and services from firms by government agencies plus the total value of output produced by government agencies themselves during a time period.

Net exports is the difference between exports and imports. Xn = X – M

GDP per capita is a measure of the total output of a country that takes GDP and divides it by the number of people in the country. The per capita GDP is especially useful when comparing one country to another, because it shows the relative performance of the countries.

Value Added is the additional economic value that a company adds to its products and services before offering final goods to customers. According to the Value Added Method, instead of taking value of final products, value added by each firm at each stage of production is included.

Gross National Product (GNP) is the total value of final goods and services produced during a particular period with factors of production owned by the residents of a particular country. GNP = GDP + net income received from abroad by residents of a nation.

Gross Domestic Income (**GDI)** is the total income generated in an economy by the production of final goods and services during a particular period. Because an economy's total output equals the total income generated in producing that output, GDP = GDI. The components of GDI are employee compensation, profits, rental income, net interest, depreciation, and Indirect taxes.

Employee compensation in the form of wages, salaries, and benefits makes up the largest single component of income generated in the production of GDP.

The **profit** component of income earned by firms and households equals total revenues of firms less costs as measured by conventional accounting.

Rental income is the income earned by owners of rental housing or payments for the rent of natural resources. It is a charge for the temporary use of some capital asset or natural resource.

Net interest equals interest paid less interest received by domestic businesses, plus interest received from foreigners less interest paid to foreigners. Interest payments on mortgage and home improvement loans are counted as interest paid by business, because homeowners are treated as businesses in the income accounts.

Depreciation is a measure of the amount of capital that wears out or becomes obsolete during a period. Depreciation is referred to in official reports as the consumption of fixed capital. Depreciation is a cost of production, so it represents part of the price charged for goods and services. It is therefore counted as part of the income generated in the production of those goods and services.

Indirect taxes are taxes imposed on the production or sale of goods and services or on other business activity and are counted as income component.

Multiplier is the ratio of the change in the quantity of real GDP demanded at each price level to the initial change in one or more components of aggregate demand that produced it:

Multiplier = Δ (real GDP demanded at each price level)/initial Δ (component of AD)

Short run in macroeconomics is a period in which wages and some other prices are sticky.

Long run is a period in which full wage and price flexibility, and market adjustment, has been achieved, so that the economy is at the natural level of employment and potential output.

S**hort-run aggregate supply (SRAS) curve** is an upward-sloping curve that shows the quantity of total output that will be produced at each price level in the short run. Wage and price stickiness account for the short run aggregate supply curve's upward slope.

Recessionary gap is where an economy is operating at below its full-employment equilibrium. Under this condition, the level of real GDP is currently lower than it is at full employment.

Inflationary gap is a macroeconomic concept that describes the difference between the current level of real GDP and the anticipated GDP that would be experienced when an economy is at full employment, also referred to as the potential GDP. For the gap to be considered inflationary, the current real GDP must be higher than the potential GDP.

Aggregate demand is the relationship between the total quantity of goods and services demanded (from all the four sources of demand) and the price level, all other

determinants of spending unchanged. The aggregate quantity of goods and services demanded is measured as real GDP. It is also the total amount of spending in the economy (by consumers, by government, or by firms).

Aggregate supply is the total national output of goods and services. When aggregate supply increases, spending in the economy will also increase.

Long Run Aggregate Supply (LRAS) Economic growth means the economy's potential output is rising. Because the long-run aggregate supply curve is a vertical line at the economy's potential, we can depict the process of economic growth as one in which the long-run aggregate supply curve shifts to the right.

Money is anything that serves as a medium of exchange. It also serves as a unit of account and as a store of value.

Medium of exchange is anything that is widely accepted as a means of payment.

Unit of account is the function of money, where it is a unit in which prices are quoted and accounts are kept.

Store of value is the function of an asset that maintains its value over time. The most common store of value in modern times has been money or a commodity like a precious metal or financial asset.

Commodity money is money that has value apart from its use as money. Gold and silver are the most widely used forms of commodity money.

Fiat money is money that some authority, generally a government, has ordered to be accepted as a medium of exchange.

Checkable deposits are balances in checking accounts, and traveler's checks are other forms of money that have no intrinsic value. They serve as a medium of exchange.

Liquidity refers to the ease with which an asset, or security, can be converted into ready cash without affecting its market price.

Velocity is the number of times the money supply is spent to obtain the goods and services that make up GDP during a particular time period.

Demand for money People hold money in order to buy goods and services (transactions demand), to have it available for unexpected expenditures

(precautionary demand), and in order to avoid possible drops in the value of other assets such as bonds (speculative demand).

Money supply is the total quantity of money in circulation in the economy at any one time.

Equilibrium in the market for money occurs when the quantity of money demanded is equal to the quantity of money supplied.

M1 is the narrowest of the money supply definitions. It includes currency in circulation, checkable deposits, and traveler's check. The assets in M1 may be regarded as perfectly liquid;

M2 is a broader measure of the money supply than M1. It includes M1 and other deposits such as small savings accounts (less than $100,000). The assets in M2 are highly liquid, but somewhat less liquid than the assets in M1.

Bank balance sheet is a financial statement that summarizes the bank's assets and liabilities at a specific point in time.

A**ssets** are resources with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit. A bank's assets include mainly loans to the customers of the bank.

Liabilities are a company's financial debt or obligations that arise during its business operations. A bank's liabilities include mainly customers' deposits.

Reserve requirement is expressed as a required reserve ratio (**rrr**), and specifies the ratio of a bank's reserves to checkable deposits which the bank must maintain according to the CB regulation.

'Bank is loaned up' occurs when a bank's excess reserves equal zero.

Deposit multiplier also referred to as a deposit expansion multiplier, is a function used to describe the amount of money a bank creates in additional money supply through the process of lending the available capital it has in excess of the bank's reserve requirement. It equals the ratio of the maximum possible change in checkable deposits (ΔD) to the change in reserves (ΔR) or a reciprocal of rrr. **md** = ΔD / ΔR or **md** = 1/rrr

Bank reserves, or **total bank reserves** (R), equal the required reserve ratio (rrr) times checkable deposits (D), in case a bank is loaned up: R = rrr D

Change in reserves Once banks are fully loaned up, the change in reserves (ΔR) will equal the required reserve ratio (rrr) times the change in deposits (ΔD): ΔR=rrr ΔD.

Discount rate is the interest rate charged by the CB when it lends reserves to commercial banks.

Open market operations refer to the buying and selling of government securities in the open market in order to expand or contract the amount of money in the banking system.

Bond is a debt security in which an investor loans money to an entity (typically corporate or governmental) which borrows the funds for a defined period at a variable or fixed interest rate.

Bond interest rate on any bond is determined by its price. As the price falls, the interest rate rises and vice versa.

Business cycle is a fluctuation in economic activity which an economy experiences over a period of time.

Inflation is an increase in the average level of prices. Inflation rate is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling.

Deflation is a decrease in the average level of prices.

Rate of inflation/deflation is the rate of change in the price index between two periods: Rate of inflation = percentage change in index / initial value of index

Hyperinflation is described as an inflation rate in excess of 200% per year

Consumer Price Index (CPI) is a price index whose movements reflect changes in price of goods and services purchased by consumers. It is sometimes called Laspeyres Index (CPI). Price index = the current cost of the basket / the base-period cost of the basket.

$$P_L = \frac{\sum(p_{c,t_n}) * (q_{c,t_0})}{\sum(p_{c,t_0}) * (q_{c,t_0})}$$

Market Basket is a fixed list of items, in given proportions used to track the progress of inflation in an economy.

Labour force is the total number of people working age who are willing and able to work.

Unemployed can be defined as a person that is not working but is capable and looking for work.

Unemployment rate is the ratio of unemployed people divided by the total labour force.

Frictional unemployment occurs because information about the labor market is costly; it takes time for firms seeking workers and workers seeking firms to find each other.

Structural unemployment occurs when there is a mismatch between the skills offered by potential workers and the skills sought by firms.

Cyclical unemployment occurs when an economy can be operating below or above its natural level of employment. Cyclical unemployment is unemployment in excess of the unemployment that exists at the natural level of employment.

Nonintervention policy is a policy choice to take no action to try to close a recessionary or an inflationary gap, but to allow the economy to adjust to its potential output on its own.

Stabilization policy is a policy in which the government or the central bank take measures to move the economy to its potential output.

Economic growth is a long-run process that occurs as an economy's potential output increases. It is a process through which an economy achieves an outward shift in its production possibilities curve.

Potential output can be described as what an economy can produce when all its resources such as workforce, equipment, technology, natural resources and others are fully utilized.

Monetary policy refers to the actions the CB takes to control either the interest rate or the money supply, often as an attempt to reduce inflation or the interest rate to

ensure price stability and general trust of the value and stability of the nation's currency.

Contractionary monetary policy is a macroeconomic tool used to slow down an economy by changing money supply and the cost of money in the economy (interest rates).

Expansionary monetary policy is a macroeconomic tool used to expand an economy by changing money supply and the cost of money in the economy (interest rates).

Time lag is a delay between an economic action and a consequence. An impact of time lags is that the effect of policy may be more difficult to quantify because it takes a period of time to actually occur.

Transfer payment is the provision of aid or money to an individual who is not required to provide anything in exchange. Social Security and welfare benefits are examples of transfer payments.

Taxes are involuntary fees levied on individuals or corporations and enforced by a government entity – whether local, regional or national – in order to finance government activities.

Direct tax is a tax an individual or organization pays directly to the imposing entity. A taxpayer, for example, pays direct taxes to the government for different purposes, including real property tax, personal property tax, income tax, or taxes on assets.

Indirect tax is a tax collected by an intermediary (such as a retail store) from the person who bears the ultimate economic burden of the tax (such as the consumer). Examples include sales tax, per unit tax, value added tax (VAT), or goods and services tax, such as excise and tariff).

Budget balance shows the difference between the government's revenues and its expenditures. A budget surplus occurs if government revenues exceed expenditures. A budget deficit occurs if government expenditures exceed revenues. The minus sign is often omitted when reporting a deficit. If the budget surplus equals zero, we say the government has a balanced budget.

Fiscal policy is the use of government expenditures and taxes to influence the level of economic activity – is the government counterpart to monetary policy. Like monetary policy, it can be used in an effort to close a recessionary or an inflationary gap.

Automatic stabilizers are any government programs that tend to reduce fluctuations in GDP automatically. Automatic stabilizers tend to increase GDP when it is falling and reduce GDP when it is rising. Changes in expenditures and taxes that occur through automatic stabilizers do not shift the aggregate demand curve. Because they are automatic, their operation is already incorporated in the curve itself.

Expansionary fiscal policy might consist of an increase in government purchases or transfer payments, a reduction in taxes, or a combination of these tools to shift the aggregate demand curve to the right.

Contractionary fiscal policy might involve a reduction in government purchases or transfer payments, an increase in taxes, or a mix of all three to shift the aggregate demand curve to the left.

Supply-side economics stresses the use of fiscal policy to stimulate economic growth. Advocates of supply-side economics generally favor tax cuts to stimulate companies' economic activity.

Balance of payments is a record of all the flows of money between residents of that country and the rest of the world.

Current account records payments for imports and exports of goods and services, plus incomes flowing into and out of the country, plus net transfers of money into and out of the country. It is normally divided into four subdivisions: the trade in goods account; the trade in services account; income flows, and current transfers of money.

Capital account records the flows of funds, into the country (credits) and out of the country (debits), associated with the acquisition or disposal of fixed assets (for example, land), the transfer of funds by migrants, and the payment of grants by the government for overseas projects and the receipt from international sources for capital projects.

Financial account of the balance of payments records cross border changes in the holding of shares, property, bank deposits and loans, government securities, etc.

Balance of trade is the difference between the value of a country's imports and exports for a given period. **Trade surplus** is when exports exceed imports. **Trade deficit** is when imports exceed exports.

Foreign Exchange or **FOREX market** is a market in which currencies of different countries are traded for one another.

Exchange rate is the price of one currency in terms of another currency.

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