The Short Run

In the short run, demand determines output. Many factors affect demand, from consumer confidence to the state of the financial system, to fiscal and monetary policy.

Chapter 3

Chapter 3 looks at equilibrium in the goods market and the determination of output. It focuses on the interaction among demand, production, and income. It shows how fiscal policy affects output.

Chapter 4

Chapter 4 looks at equilibrium in financial markets and the determination of the interest rate. It shows how monetary policy affects the interest rate.

Chapter 5

Chapter 5 looks at the goods market and financial markets together. It shows what determines output and the interest rate in the short run. It looks at the role of fiscal and monetary policy.

Chapter 6

Chapter 6 extends the model by introducing a richer financial system and uses it to explain what happened during the recent crisis.

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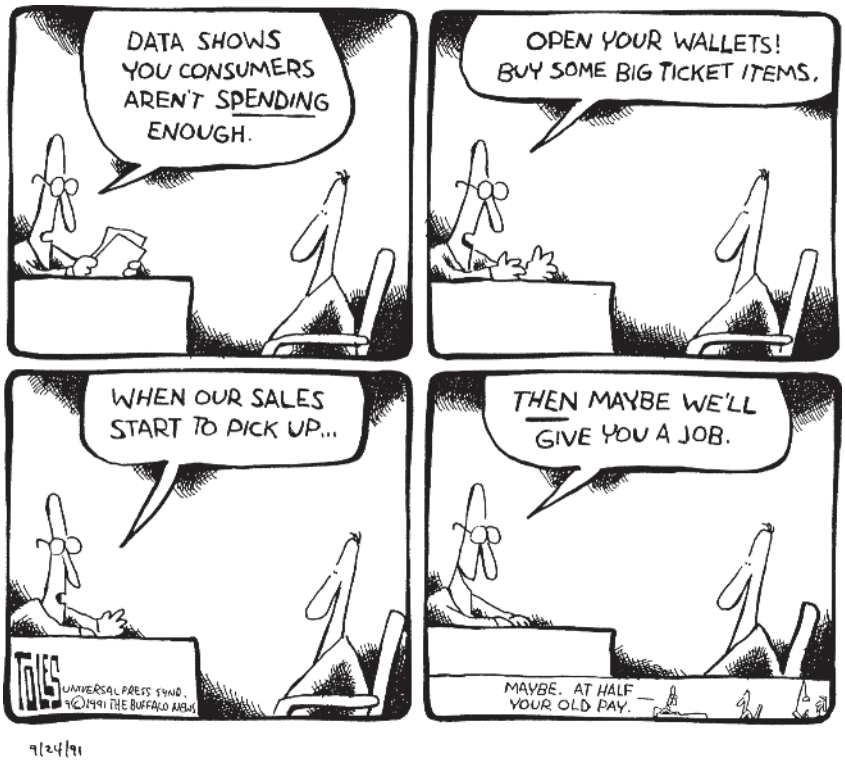
The Goods Market

When economists think about year-to-year movements in economic activity, they focus on the interactions among *production, income, and demand*:

- **Changes in the demand for goods lead to changes in production.**
- **Changes in production lead to changes in income.**
- **Changes in income lead to changes in the demand for goods.**

Nothing makes the point better than this cartoon:



This chapter looks at these interactions and their implications.

Section 3-1 looks at the composition of GDP and the different sources of the demand for goods.

Section 3-2 looks at the determinants of the demand for goods.

Section 3-3 shows how equilibrium output is determined by the condition that the production of goods must be equal to the demand for goods.

Section 3-4 gives an alternative way of thinking about the equilibrium, based on the equality of investment and saving.

Section 3-5 takes a first pass at the effects of fiscal policy on equilibrium output.

3-1 The Composition of GDP

The terms *output* and *production* are synonymous. There is no rule for using one or the other. Use the one that sounds better.

The purchase of a machine by a firm, the decision to go to a restaurant by a consumer, and the purchase of combat airplanes by the federal government are clearly different decisions and depend on different factors. So, if we want to understand what determines the demand for goods, it makes sense to decompose aggregate output (GDP) from the point of view of the different goods being produced, and from the point of view of the different buyers for these goods.

The decomposition of GDP typically used by macroeconomists is shown in Table 3-1 (a more detailed version, with precise definitions, appears in Appendix 1 at the end of the book).

Warning! To most people, the term *investment* refers to the purchase of assets like gold or shares of General Motors. Economists use *investment* to refer to the purchase of *new capital goods*, such as (new) machines, (new) buildings, or (new) houses. When economists refer to the purchase of gold, or shares of General Motors, or other financial assets, they use the term *financial investment*.

- First comes **consumption** (which we will denote by the letter C when we use algebra throughout this book). These are the goods and services purchased by consumers, ranging from food to airline tickets, to new cars, and so on. Consumption is by far the largest component of GDP. In 2014, it accounted for 68% of GDP.
- Second comes **investment** (I), sometimes called **fixed investment** to distinguish it from inventory investment (which we will discuss later). Investment is the sum of **nonresidential investment**, the purchase by firms of new plants or new machines (from turbines to computers), and **residential investment**, the purchase by people of new houses or apartments.

MyEconLab Real-time data

Table 3-1 The Composition of U.S. GDP, 2014

		Billions of Dollars	Percent of GDP
	GDP (Y)	17,348	100.0
1	Consumption (C)	11,865	68.3
2	Investment (I)	2,782	16.0
	Nonresidential	2,233	12.9
	Residential	549	3.1
3	Government spending (G)	3,152	18.1
4	Net exports	−530	−3.1
	Exports (X)	2,341	13.5
	Imports (IM)	−2,871	−16.6
5	Inventory investment	77	0.4

Source: Survey of Current Business, July 2015, Table 1-1-5.

Nonresidential investment and residential investment, and the decisions behind them, have more in common than might first appear. Firms buy machines or plants to produce output in the future. People buy houses or apartments to get *housing services* in the future. In both cases, the decision to buy depends on the services these goods will yield in the future, so it makes sense to treat them together. Together, nonresidential and residential investment accounted for 16% of GDP in 2014.

- Third comes **government spending** (G). This represents the purchases of goods and services by the federal, state, and local governments. The goods range from airplanes to office equipment. The services include services provided by government employees: In effect, the national income accounts treat the government as buying the services provided by government employees—and then providing these services to the public, free of charge.

  Note that G does not include **government transfers**, like Medicare or Social Security payments, nor interest payments on the government debt. Although these are clearly government expenditures, they are not purchases of goods and services. That is why the number for government spending on goods and services in Table 3-1, 18.1% of GDP, is smaller than the number for total government spending including transfers and interest payments. That number, in 2014, was approximately 33% of GDP when transfers and interest payments of federal, state, and local governments are combined.

- The sum of lines 1, 2, and 3 gives the *purchases of goods and services by U.S. consumers, U.S. firms, and the U.S. government.* To determine the *purchases of U.S. goods and services*, two more steps are needed:

  First, we must add **exports** (X), the purchases of U.S. goods and services by foreigners.

  Second, we must subtract **imports** (IM) the purchases of foreign goods and services by U.S. consumers, U.S. firms, and the U.S. government.

  The difference between exports and imports is called **net exports** $(X - IM)$, or the **trade balance**. If exports exceed imports, the country is said to run a **trade surplus**. If exports are less than imports, the country is said to run a **trade deficit**. In 2014, U.S. exports accounted for 13.5% of GDP. U.S. imports were equal to 16.6% of GDP, so the United States was running a trade deficit equal to 3.1% of GDP.

Exports > imports ⇔ trade surplus
Imports > exports ⇔ trade deficit

- So far we have looked at various sources of purchases (sales) of U.S. goods and services in 2014. To determine U.S. production in 2014, we need to take one last step:

  In any given year, production and sales need not be equal. Some of the goods produced in a given year are not sold in that year but in later years. And some of the goods sold in a given year may have been produced in a previous year. The difference between goods produced and goods sold in a given year—the difference between production and sales, in other words—is called **inventory investment**.

Although it is called 'inventory investment', the word *investment* is slightly misleading. In contrast to fixed investment, which represents decisions by firms, inventory investment is partly involuntary, reflecting the fact that firms did not anticipate sales accurately in making production plans.

If production exceeds sales and firms accumulate inventories as a result, then inventory investment is said to be positive. If production is less than sales and firms' inventories fall, then inventory investment is said to be negative. Inventory investment is typically small—positive in some years and negative in others. In 2014, inventory investment was positive, equal to just \$77 billion. Put another way, production was higher than sales by an amount equal to \$77 billion.

We now have what we need to develop our first model of output determination.

Make sure you understand each of these three equivalent ways of stating the relations among production, sales, and inventory investment:

Inventory investment = production − sales
Production = sales + inventory investment
Sales = Production − inventory investment

3-2 The Demand for Goods

Denote the total demand for goods by Z. Using the decomposition of GDP we saw in Section 3-1, we can write Z as

$$Z \equiv C + I + G + X - IM$$

This equation is an **identity** (which is why it is written using the symbol "≡" rather than an equals sign). It *defines* Z as the sum of consumption, plus investment, plus government spending, plus exports, minus imports.

Recall that inventory investment is not part of demand.

We now need to think about the determinants of Z. To make the task easier, let's first make a number of simplifications:

A model nearly always starts with "Assume" (or "Suppose"). This is an indication that reality is about to be simplified to focus on the issue at hand.

- Assume that all firms produce the same good, which can then be used by consumers for consumption, by firms for investment, or by the government. With this (big) simplification, we need to look at only one market—the market for "the" good—and think about what determines supply and demand in that market.
- Assume that firms are willing to supply any amount of the good at a given price level P. This assumption allows us to focus on the role demand plays in the determination of output. As we shall see, this assumption is valid only in the short run. When we move to the study of the medium run (starting in Chapter 7), we shall abandon it. But for the moment, it will simplify our discussion.
- Assume that the economy is *closed*—that it does not trade with the rest of the world: Both exports and imports are zero. This assumption clearly goes against the facts: Modern economies trade with the rest of the world. Later on (starting in Chapter 17), we will abandon this assumption as well and look at what happens when the economy is open. But, for the moment, this assumption will also simplify our discussion because we won't have to think about what determines exports and imports.

Under the assumption that the economy is closed, $X = IM = 0$, so the demand for goods Z is simply the sum of consumption, investment, and government spending:

$$Z \equiv C + I + G$$

Let's discuss each of these three components in turn.

Consumption (C)

Consumption decisions depend on many factors. But the main one is surely income, or, more precisely, **disposable income** (Y_D), the income that remains once consumers have received transfers from the government and paid their taxes. When their disposable income goes up, people buy more goods; when it goes down, they buy fewer goods.

We can then write:

$$C = C(Y_D) \qquad (3.1)$$
$$(+)$$

This is a formal way of stating that consumption C is a function of disposable income Y_D. The function $C(Y_D)$ is called the **consumption function**. The positive sign below Y_D reflects the fact that when disposable income increases, so does consumption. Economists call such an equation a **behavioral equation** to indicate that the equation captures some aspect of behavior—in this case, the behavior of consumers.

We will use functions in this book as a way of representing relations between variables. What you need to know about functions—which is very little—is described in Appendix 2 at the end of the book. This appendix develops the mathematics you need to go through this book. Not to worry: We shall always describe a function in words when we introduce it for the first time.

It is often useful to be more specific about the form of the function. Here is such a case. It is reasonable to assume that the relation between consumption and disposable income is given by the simpler relation:

$$C = c_0 + c_1 Y_D \tag{3.2}$$

In other words, it is reasonable to assume that the function is a **linear relation**. The relation between consumption and disposable income is then characterized by two **parameters**, c_0 and c_1:

◀ Think about your own consumption behavior. What are your values of c_0 and c_1?

- The parameter c_1 is called the **propensity to consume**. (It is also called the *marginal propensity to consume*. I will drop the word *marginal* for simplicity.) It gives the effect an additional dollar of disposable income has on consumption. If c_1 is equal to 0.6, then an additional dollar of disposable income increases consumption by $\$1 \times 0.6 = 60$ cents.

  A natural restriction on c_1 is that it be positive: An increase in disposable income is likely to lead to an increase in consumption. Another natural restriction is that c_1 be less than 1: People are likely to consume only part of any increase in disposable income and save the rest.
- The parameter c_0 has a literal interpretation. It is what people would consume if their disposable income in the current year were equal to zero: If Y_D equals zero in equation (3.2), $C = c_0$. If we use this interpretation, a natural restriction is that, if current income were equal to zero, consumption would still be positive: With or without income, people still need to eat! This implies that c_0 is positive. How can people have positive consumption if their income is equal to zero? Answer: They dissave. They consume either by selling some of their assets or by borrowing.
- The parameter c_0 has a less literal and more frequently used interpretation. Changes in c_0 reflect changes in consumption for a given level of disposable income. Increases in c_0 reflect an increase in consumption given income, decreases in c_0 a decrease. There are many reasons why people may decide to consume more or less, given their disposable income. They may, for example, find it easier or more difficult to borrow, or may become more or less optimistic about the future. An example of a decrease in c_0 is given in the Focus box, "The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function."

The relation between consumption and disposable income shown in equation (3.2) is drawn in Figure 3-1. Because it is a linear relation, it is represented by a straight line.

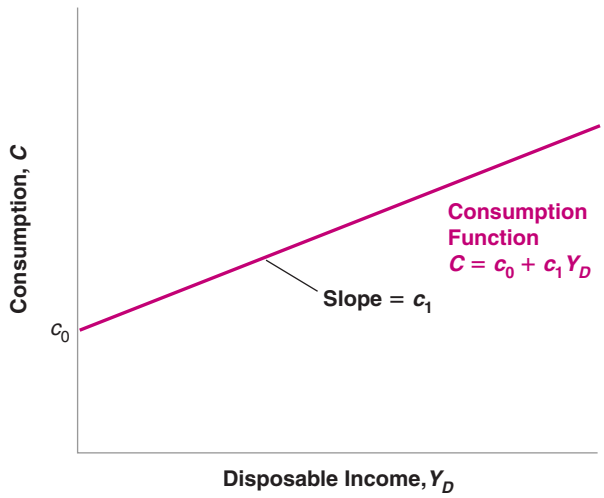


Figure 3-1

Consumption and Disposable Income

Consumption increases with disposable income but less than one for one. A lower value of c_0 will shift the entire line down.

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Its intercept with the vertical axis is c_0; its slope is c_1. Because c_1 is less than 1, the slope of the line is less than 1: Equivalently, the line is flatter than a 45-degree line. If the value of c_0 increases, then the line shifts up by the same amount. (A refresher on graphs, slopes, and intercepts is given in Appendix 2.)

Next we need to define disposable income Y_D. Disposable income is given by

$$Y_D \equiv Y - T$$

In the United States, the two major taxes paid by individuals are income taxes and Social Security contributions. The main government transfers are Social Security benefits, Medicare (health care for retirees), and Medicaid (health care for the poor). In 2014, taxes and social contributions paid by individuals were $2,900 billion, and government transfers to individuals were $2,500 billion.

where Y is income and T is taxes paid minus government transfers received by consumers. For short, we will refer to T simply as taxes—but remember that it is equal to taxes minus transfers. Note that the equation is an identity, indicated by "≡".

Replacing Y_D in equation (3.2) gives

$$C = c_0 + c_1(Y - T) \tag{3.3}$$

Equation (3.3) tells us that consumption C is a function of income Y and taxes T. Higher income increases consumption, but less than one for one. Higher taxes decrease consumption, also less than one for one.

Investment (I)

Models have two types of variables. Some variables depend on other variables in the model and are therefore explained within the model. Variables like these are called **endogenous variables**. This was the case for consumption given previously. Other variables are not explained within the model but are instead taken as given. Variables like these are called **exogenous variables**. This is how we will treat investment here. We will take investment as given and write:

$$I = \bar{I} \tag{3.4}$$

Endogenous variables: explained within the model
Exogenous variables: taken as given

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Putting a bar on investment is a simple typographical way to remind us that we take investment as given.

We take investment as given to keep our model simple. But the assumption is not innocuous. It implies that, when we later look at the effects of changes in production, we will assume that investment does not respond to changes in production. It is not hard to see that this implication may be a bad description of reality: Firms that experience an increase in production might well decide they need more machines and increase their investment as a result. For now, though, we will leave this mechanism out of the model. In Chapter 5 we will introduce a more realistic treatment of investment.

Government Spending (G)

The third component of demand in our model is government spending, G. Together with taxes T, G describes **fiscal policy**—the choice of taxes and spending by the government. Just as we just did for investment, we will take G and T as exogenous. But the reason why we assume G and T are exogenous is different from the reason we assumed investment is exogenous. It is based on two distinct arguments:

Recall: Taxes means taxes minus government transfers.

- First, governments do not behave with the same regularity as consumers or firms, so there is no reliable rule we could write for G or T corresponding to the rule we wrote, for example, for consumption. (This argument is not airtight, though. Even if governments do not follow simple behavioral rules as consumers do, a good part of their behavior is predictable. We will look at these issues later, in particular in Chapters 22 and 23. Until then, I shall set them aside.)
- Second, and more importantly, one of the tasks of macroeconomists is to think about the implications of alternative spending and tax decisions. We want to be able to say, "If the government was to choose these values for G and T, this is what would

happen." The approach in this book will typically treat G and T as variables chosen by the government and will not try to explain them within the model.

Because we will (nearly always) take G and T as exogenous, I won't use a bar to denote their values. This will keep the notation lighter.

3-3 The Determination of Equilibrium Output

Let's put together the pieces we have introduced so far.

Assuming that exports and imports are both zero, the demand for goods is the sum of consumption, investment, and government spending:

$$Z \equiv C + I + G$$

Replacing C and I from equations (3.3) and (3.4), we get

$$Z = c_0 + c_1(Y - T) + \bar{I} + G \tag{3.5}$$

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The demand for goods Z depends on income Y, taxes T, investment $\bar{I}$ and government spending G.

Let's now turn to **equilibrium** in the goods market, and the relation between production and demand. If firms hold inventories, then production need not be equal to demand: For example, firms can satisfy an increase in demand by drawing upon their inventories—by having negative inventory investment. They can respond to a decrease in demand by continuing to produce and accumulating inventories—by having positive inventory investment. Let's first ignore this complication, though, and begin by assuming that firms do not hold inventories. In this case, inventory investment is always equal to zero, and **equilibrium in the goods market** requires that production Y be equal to the demand for goods Z:

Think of an economy that produces only haircuts. There cannot be inventories of haircuts—haircuts produced but not sold?—so production must always be equal to demand.

$$Y = Z \tag{3.6}$$

This equation is called an **equilibrium condition**. Models include three types of equations: identities, behavioral equations, and equilibrium conditions. You now have seen examples of each: The equation defining disposable income is an identity, the consumption function is a behavioral equation, and the condition that production equals demand is an equilibrium condition.

There are three types of equations:

Identities
Behavioral equations
Equilibrium conditions

Replacing demand Z in (3.6) by its expression from equation (3.5) gives

$$Y = c_0 + c_1(Y - T) + \bar{I} + G \tag{3.7}$$

Equation (3.7) represents algebraically what we stated informally at the beginning of this chapter:

In equilibrium, production, Y (the left side of the equation), is equal to demand (the right side). Demand in turn depends on income, Y, which is itself equal to production.

Can you relate this statement to the cartoon at the start of the chapter?

Note that we are using the same symbol Y for production and income. This is no accident! As you saw in Chapter 2, we can look at GDP either from the production side or from the income side. Production and income are identically equal.

Having constructed a model, we can solve it to look at what determines the level of output—how output changes in response to, say, a change in government spending. Solving a model means not only solving it algebraically but also understanding why the results are what they are. In this book, solving a model will also mean characterizing the results using graphs—sometimes skipping the algebra altogether—and describing the results and the mechanisms in words. Macroeconomists always use these three tools:

1. Algebra to make sure that the logic is correct,
2. Graphs to build the intuition, and
3. Words to explain the results.

Make it a habit to do the same.

Using Algebra

Rewrite the equilibrium equation (3.7):

$$Y = c_0 + c_1 Y - c_1 T + \bar{I} + G$$

Move $c_1 Y$ to the left side and reorganize the right side:

$$(1 - c_1)Y = c_0 + \bar{I} + G - c_1 T$$

Divide both sides by $(1 - c_1)$:

$$Y = \frac{1}{1 - c_1}[c_0 + \bar{I} + G - c_1 T] \tag{3.8}$$

Equation (3.8) characterizes equilibrium output, the level of output such that production equals demand. Let's look at both terms on the right, beginning with the term in brackets.

- The term $[c_0 + \bar{I} + G - c_1 T]$ is that part of the demand for goods that does not depend on output. For this reason, it is called **autonomous spending**.

  Autonomous means independent—in this case, independent of output.

  Can we be sure that autonomous spending is positive? We cannot, but it is very likely to be. The first two terms in brackets, c_0 and $\bar{I}$, are positive. What about the last two, $G - c_1 T$? Suppose the government is running a **balanced budget**—taxes equal government spending. If $T = G$, and the propensity to consume (c_1) is less than 1 (as we have assumed), then $(G - c_1 T)$ is positive and so is autonomous spending. Only if the government were running a very large budget surplus—if taxes were much larger than government spending—could autonomous spending be negative. We can safely ignore that case here.
- Turn to the first term, $1/(1 - c_1)$. Because the propensity to consume (c_1) is between zero and 1, $1/(1 - c_1)$ is a number greater than one. For this reason, this number, which *multiplies* autonomous spending, is called the **multiplier**. The closer c_1 is to 1, the larger the multiplier.
  If $T = G$, then

$$(G - c_1 T) = (T - c_1 T) = (1 - c_1)T > 0$$

  What does the multiplier imply? Suppose that, for a given level of income, consumers decide to consume more. More precisely, assume that c_0 in equation (3.3) increases by \$1 billion. Equation (3.8) tells us that output will increase by more than \$1 billion. For example, if c_1 equals 0.6, the multiplier equals $1/(1 - 0.6) = 1/0.4 = 2.5$. so that output increases by $2.5 \times \$1$ billion $= \$2.5$ billion.

  We have looked at an increase in consumption, but equation (3.8) makes it clear that any change in autonomous spending—from a change in investment, to a change in government spending, to a change in taxes—will have the same qualitative effect: It will change output by more than its direct effect on autonomous spending.

  Where does the multiplier effect come from? Looking back at equation (3.7) gives us the clue: An increase in c_0 increases demand. The increase in demand then leads to an increase in production. The increase in production leads to an equivalent increase in income (remember the two are identically equal). The increase in income further increases consumption, which further increases demand, and so on. The best way to describe this mechanism is to represent the equilibrium using a graph. Let's do that.

Using a Graph

Let's characterize the equilibrium graphically.

- First, plot production as a function of income.

  In Figure 3-2, measure production on the vertical axis. Measure income on the horizontal axis. Plotting production as a function of income is straightforward: Recall that production and income are identically equal. Thus, the relation between them is the 45-degree line, the line with a slope equal to 1.
- Second, plot demand as a function of income.

  The relation between demand and income is given by equation (3.5). Let's rewrite it here for convenience, regrouping the terms for autonomous spending together in the term in parentheses:

$$Z = (c_0 + \bar{I} + G - c_1 T) + c_1 Y \tag{3.9}$$

  Demand depends on autonomous spending and on income—via its effect on consumption. The relation between demand and income is drawn as ZZ in the graph. The intercept with the vertical axis—the value of demand when income is equal to zero—equals autonomous spending. The slope of the line is the propensity to consume, c_1: When income increases by 1, demand increases by c_1. Under the restriction that c_1 is positive but less than 1, the line is upward sloping but has a slope of less than 1.
- In equilibrium, production equals demand.

  Equilibrium output, Y, therefore occurs at the intersection of the 45-degree line and the demand function. This is at point A. To the left of A, demand exceeds production; to the right of A, production exceeds demand. Only at A are demand and production equal.

Suppose that the economy is at the initial equilibrium, represented by point A in the graph, with production equal to Y.

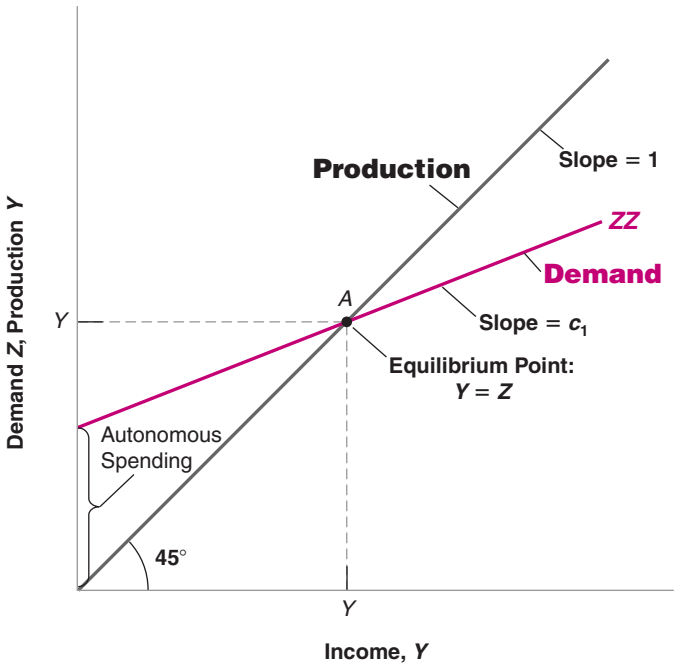

Figure 3-2

Equilibrium in the Goods Market

Equilibrium output is determined by the condition that production is equal to demand.

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Now suppose c_0 increases by \$1 billion. At the initial level of income (the level of disposable income associated with point A since T is unchanged in this example), consumers increase their consumption by \$1 billion. This makes use of the second interpretation of the value of c_0. What happens is shown in Figure 3-3, which builds on Figure 3-2.

Equation (3.9) tells us that, for any value of income, if c_0 is higher by \$1 billion, demand is higher by \$1 billion. Before the increase in c_0, the relation between demand and income was given by the line ZZ. After the increase in c_0 by \$1 billion, the relation between demand and income is given by the line ZZ′, which is parallel to ZZ but higher by \$1 billion. In other words, the demand curve shifts up by \$1 billion. The new equilibrium is at the intersection of the 45-degree line and the new demand relation, at point A'.

Look at the vertical axis. The distance between Y and Y' on the vertical axis is larger than the distance between A and B—which is equal to \$1 billion.

Equilibrium output increases from Y to Y'. The increase in output, $(Y' - Y)$, which we can measure either on the horizontal or the vertical axis, is larger than the initial increase in consumption of \$1 billion. This is the multiplier effect.

With the help of the graph, it becomes easier to tell how and why the economy moves from A to A'. The initial increase in consumption leads to an increase in demand of \$1 billion. At the initial level of income, Y, the level of demand is shown by point B: Demand is \$1 billion higher. To satisfy this higher level of demand, firms increase production by \$1 billion. This increase in production of \$1 billion implies that income increases by \$1 billion (recall: income = production), so the economy moves to point C. (In other words, both production and income are higher by \$1 billion.) But this is not the end of the story. The increase in income leads to a further increase in demand. Demand is now shown by point D. Point D leads to a higher level of production, and so on, until the economy is at A', where production and demand are again equal. This is therefore the new equilibrium.

We can pursue this line of explanation a bit more, which will give us another way to think about the multiplier.

- The first–round increase in demand, shown by the distance AB in Figure 3-3—equals \$1 billion.

Figure 3-3

The Effects of an Increase in Autonomous Spending on Output

An increase in autonomous spending has a more than one-for-one effect on equilibrium output.

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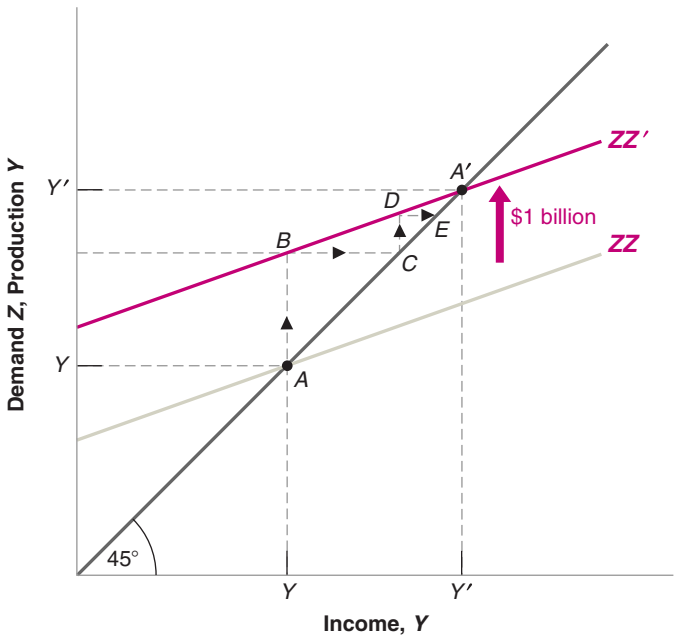

- This first-round increase in demand leads to an equal increase in production, or \$1 billion, which is also shown by the distance *AB*.
- This first-round increase in production leads to an equal increase in income, shown by the distance *BC*, also equal to \$1 billion.
- The second-round increase in demand, shown by the distance *CD*, equals \$1 billion (the increase in income in the first round) times the propensity to consume, c_1—hence, $\$c_1$ billion.
- This second-round increase in demand leads to an equal increase in production, also shown by the distance *CD*, and thus an equal increase in income, shown by the distance *DE*.
- The third-round increase in demand equals $\$c_1$ billion (the increase in income in the second round), times c_1, the marginal propensity to consume; it is equal to $\$c_1 \times c_1 = \$c_1^2$ billion, and so on.

Following this logic, the total increase in production after, say, $n + 1$ rounds equals \$1 billion times the sum:

$$1 + c_1 + c_1^2 + \cdots + c_1^n$$

Such a sum is called a **geometric series**. Geometric series will frequently appear in this book. A refresher is given in Appendix 2 at the end of the book. One property of geometric series is that, when c_1 is less than one (as it is here) and as n gets larger and larger, the sum keeps increasing but approaches a limit. That limit is $1/(1 - c_1)$, making the eventual increase in output $\$1/(1 - c_1)$ billion.

The expression $1/(1 - c_1)$ should be familiar: It is the multiplier, derived another way. This gives us an equivalent, but more intuitive way of thinking about the multiplier. We can think of the original increase in demand as triggering successive increases in production, with each increase in production leading to an increase in income, which leads to an increase in demand, which leads to a further increase in production, which leads … and so on. The multiplier is the sum of all these successive increases in production.

Trick question: Think about the multiplier as the result of these successive rounds. What would happen in each successive round if c_1, the propensity to consume, was larger than one?

Using Words

How can we summarize our findings in words?

Production depends on demand, which depends on income, which is itself equal to production. An increase in demand, such as an increase in government spending, leads to an increase in production and a corresponding increase in income. This increase in income leads to a further increase in demand, which leads to a further increase in production, and so on. The end result is an increase in output that is larger than the initial shift in demand, by a factor equal to the multiplier.

The size of the multiplier is directly related to the value of the propensity to consume: The higher the propensity to consume, the higher the multiplier. What is the value of the propensity to consume in the United States today? To answer this question, and more generally to estimate behavioral equations and their parameters, economists use **econometrics**, the set of statistical methods used in economics. To give you a sense of what econometrics is and how it is used, read Appendix 3 at the end of this book. This appendix gives you a quick introduction, along with an application estimating the propensity to consume. A reasonable estimate of the propensity to consume in the United States today is around 0.6 (the regressions in Appendix 3 yield two estimates, 0.5 and 0.8). In other words, an additional dollar of disposable income leads on average to an increase in consumption of 60 cents. This implies that the multiplier is equal to $1/(1 - c_1) = 1/(1 - 0.6) = 2.5$.

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The empirical evidence suggests that multipliers are typically smaller than that. This is because the simple model developed in this chapter leaves out a number of important mechanisms, for example, the reaction of monetary policy to changes in spending, or the fact that some of the demand falls on foreign goods. We shall come back to the issue as we go through the book.

How Long Does It Take for Output to Adjust?

Let's return to our example one last time. Suppose that c_0 increases by \$1 billion. We know that output will increase by an amount equal to the multiplier $1/(1 - c_1)$ times \$1 billion. But how long will it take for output to reach this higher value?

In the model we saw previously, we ruled out this possibility by assuming firms did not hold inventories, and so could not rely on drawing down inventories to satisfy an increase demand.

Under the assumptions we have made so far, the answer is: Right away! In writing the equilibrium condition (3.6), I have assumed that production is always equal to demand. In other words, I have assumed that production responds to demand instantaneously. In writing the consumption function (3.2) as I did, I have assumed that consumption responds to changes in disposable income instantaneously. Under these two assumptions, the economy goes instantaneously from point A to point A' in Figure 3-3: The increase in demand leads to an immediate increase in production, the increase in income associated with the increase in production leads to an immediate increase in demand, and so on. There is nothing wrong in thinking about the adjustment in terms of successive rounds as we did previously, even though the equations indicate that all these rounds happen at once.

This instantaneous adjustment isn't really plausible: A firm that faces an increase in demand might well decide to wait before adjusting its production, meanwhile drawing down its inventories to satisfy demand. A worker who gets a pay raise might not adjust her consumption right away. These delays imply that the adjustment of output will take time.

Formally describing this adjustment of output over time—that is, writing the equations for what economists call the **dynamics** of adjustment, and solving this more complicated model—would be too hard to do here. But it is easy to do it informally in words:

- Suppose, for example, that firms make decisions about their production levels at the beginning of each quarter. Once their decisions are made, production cannot be adjusted for the rest of the quarter. If purchases by consumers are higher than production, firms draw down their inventories to satisfy the purchases. On the other hand, if purchases are lower than production, firms accumulate inventories.
- Now suppose consumers decide to spend more, that they increase c_0. During the quarter in which this happens, demand increases, but production—because we assumed it was set at the beginning of the quarter—doesn't yet change. Therefore, income doesn't change either.
- Having observed an increase in demand, firms are likely to set a higher level of production in the following quarter. This increase in production leads to a corresponding increase in income and a further increase in demand. If purchases still exceed production, firms further increase production in the following quarter, and so on.
- In short, in response to an increase in consumer spending, output does not jump to the new equilibrium, but rather increases over time from Y to Y'.

  How long this adjustment takes depends on how and when firms revise their production schedule. If firms adjust their production schedules more frequently in response to past increases in purchases, the adjustment will occur faster.

We will often do in this book what I just did here. After we have looked at changes in equilibrium output, we will then describe informally how the economy moves from one equilibrium to the other. This will not only make the description of what happens in the economy feel more realistic, but it will often reinforce your intuition about why the equilibrium changes.

We have focused in this section on increases in demand. But the mechanism, of course, works both ways: Decreases in demand lead to decreases in output. The recent recession was the result of two of the four components of autonomous spending dropping

The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function

FOCUS

Why would consumers decrease consumption if their disposable income has not changed? Or, in terms of equation (3.2), why might c_0 decrease—leading in turn to a decrease in demand, output, and so on?

One of the first reasons that come to mind is that, even if their current income has not changed, they start worrying about the future and decide to save more. This is precisely what happened at the start of the crisis, in late 2008 and early 2009. The basic facts are shown in Figure 1 below. The figure plots, from the first quarter of 2008 to the third quarter of 2009, the behavior of three variables, disposable income, total consumption, and consumption of durables—the part of consumption that falls on goods such as cars, computers, and so on (Appendix 1 at the end of the book gives a more precise definition). To make things visually simple, all three variables are normalized to equal 1 in the first quarter of 2008.

Note two things about the figure. First, despite the fact that the crisis led to a large fall in GDP, during that period, disposable income did not initially move much. It even increased in the first quarter of 2008. But consumption was unchanged from the first to the second quarter of 2008 and then fell before disposable income fell. It fell by 3 percentage points in 2009 relative to 2008, more than the decrease in disposable income. In terms of the Figure 1, the distance between the line for disposable income and the line for consumption increased. Second, during the third and especially the fourth quarters of 2008, the consumption of durables dropped sharply. By the fourth quarter of 2008, it was down 10% relative to the first quarter, before recovering in early 2009 and decreasing again later.

Why did consumption, and especially, consumption of durables, decrease at the end of 2008 despite relatively small changes in disposable income? A number of factors were at play, but the main one was the psychological fallout of the financial crisis. Recall from Chapter 1, that, on September 15, 2008, Lehman Brothers, a very large bank, went bankrupt, and that, in the ensuing weeks, it appeared that many more banks might follow suit and the financial system might collapse. For most people, the main sign of trouble was what they read in newspapers: Even though they still had their job and received their monthly income checks, the events reminded them of the stories of the Great Depression and the pain that came with it. One way to see this is to look at the Google Trends series that gives the number of searches for "Great Depression," from January 2008 to September 2009, and is plotted in Figure 2. The series is normalized so its average value is 1 over the two years. Note how sharply the series peaked in October 2008 and then slowly decreased over the course of 2009, as it became clear that, while the crisis was a serious one, policy makers were going to do whatever they could do to avoid a repeat of the Great Depression.

If you felt that the economy might go into another Great Depression, what would you do? Worried that you might become unemployed or that your income might decline in the future, you would probably cut consumption, even if

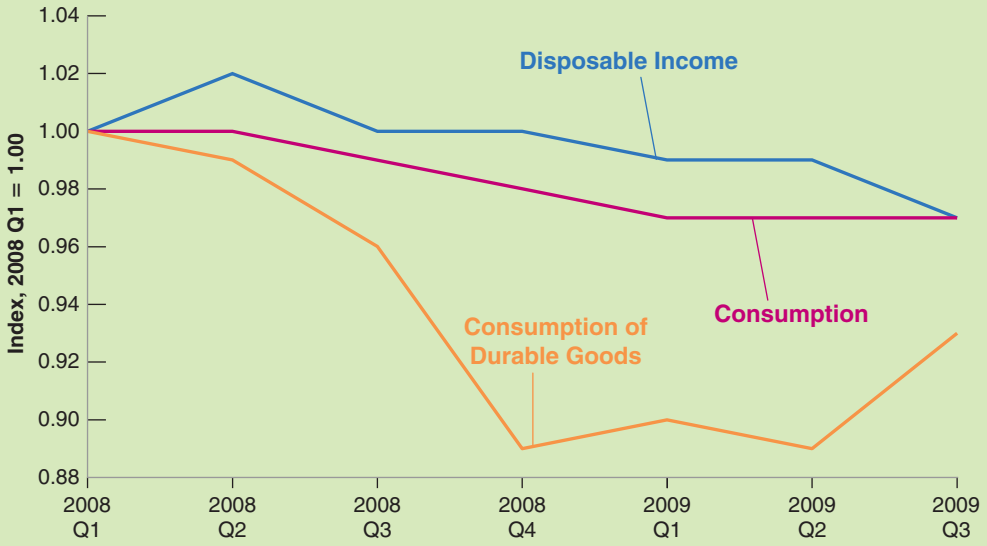

Figure 1 *Disposable Income, Consumption, and Consumption of Durables in the United States, 2008:1 to 2009:3*

Source: Calculated using series DPIC96, PCECC96, PCDGCC96: Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/.

your disposable income had not yet changed. And, given the uncertainty about what was going on, you might also delay the purchases you could afford to delay; for example, the purchase of a new car or a new TV. As Figure 1 in this box shows, this is exactly what consumers did in late 2008: Total consumption decreased, and consumption of durables collapsed. In 2009, as the smoke slowly cleared and the worse scenarios became increasingly unlikely, consumption of durables picked up. But by then, many other factors were contributing to the crisis.

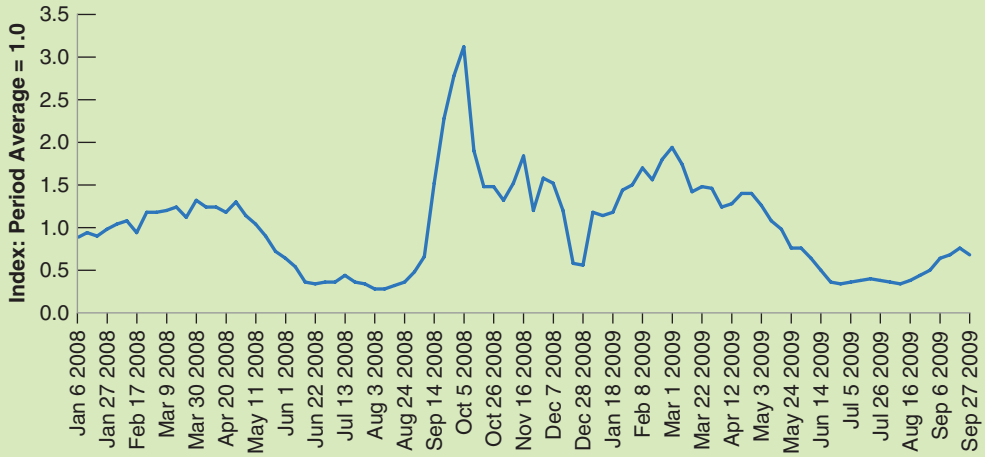

Figure 2 *Google Search Volume for "Great Depression," January 2008 to September 2009*

Source: Google Trends, "Great Depression."

by a large amount at the same time. To remind you, the expression for autonomous spending is $[c_0 + I + G - c_1 T]$. The Focus box "The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function" shows how, when the crisis started, worries about the future led consumers to cut their spending despite the fact that their disposable income had not yet declined; that is, c_0 decreased sharply. As house prices fell, building new homes became much less desirable. New homes are part of autonomous investment spending, so I also fell sharply. As autonomous spending decreased, the total demand for goods fell, and so did output. We shall return at many points in the book to the factors and the mechanisms behind the crisis and steadily enrich our story line. But this effect on autonomous spending will remain a central element of the story.

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods-Market Equilibrium

Thus far, we have been thinking of equilibrium in the goods market in terms of the equality of the production and the demand for goods. An alternative—but, it turns out, equivalent—way of thinking about equilibrium focuses instead on investment and saving. This is how John Maynard Keynes first articulated this model in 1936, in *The General Theory of Employment, Interest and Money.*

Let's start by looking at saving. Saving is the sum of private saving and public saving.

- By definition, **private saving** (S), (i.e. saving by consumers) is equal to their disposable income minus their consumption:

$$S \equiv Y_D - C$$

Using the definition of disposable income, we can rewrite private saving as income minus taxes minus consumption:

$$S \equiv Y - T - C$$

Private saving is also done by firms, who do not distribute all of their profits and use those retained earnings to finance investment. For simplicity, we ignore saving by firms here. But the bottom line, namely the equality of investment and saving in equation (3.10), does not depend on this simplification.

- By definition, **public saving** $(T - G)$ is equal to taxes (net of transfers) minus government spending. If taxes exceed government spending, the government is running a **budget surplus**, so public saving is positive. If taxes are less than government spending, the government is running a **budget deficit**, so public saving is negative.

Public saving $> 0 \Leftrightarrow$ Budget surplus

- Now return to the equation for equilibrium in the goods market that we derived previously. Production must be equal to demand, which, in turn, is the sum of consumption, investment, and government spending:

$$Y = C + I + G$$

Subtract taxes (T) from both sides and move consumption to the left side:

$$Y - T - C = I + G - T$$

The left side of this equation is simply private saving (S), so

$$S = I + G - T$$

Or, equivalently,

$$I = S + (T - G) \tag{3.10}$$

On the left is investment. On the right is saving, the sum of *private saving* and *public saving*.

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Equation (3.10) gives us another way of thinking about equilibrium in the goods market: It says that equilibrium in the goods market requires that investment equal **saving**—the sum of private and public saving. This way of looking at equilibrium explains why the equilibrium condition for the goods market is called the ***IS* relation**, which stands for "**I**nvestment equals **S**aving": What firms want to invest must be equal to what people and the government want to save.

To understand equation (3.10), imagine an economy with only one person who has to decide how much to consume, invest, and save—a "Robinson Crusoe" economy, for example. For Robinson Crusoe, the saving and the investment decisions are one and the same: What he invests (say, by keeping rabbits for breeding rather than having them for dinner), he automatically saves. In a modern economy, however, investment decisions are made by firms, whereas saving decisions are made by consumers and the government. In equilibrium, equation (3.10) tells us, all these decisions have to be consistent: Investment must equal saving.

To summarize: There are two equivalent ways of stating the condition for equilibrium in the goods market:

$$\text{Production} = \text{Demand}$$
$$\text{Investment} = \text{Saving}$$

We characterized the equilibrium using the first condition, equation (3.6). We now do the same using the second condition, equation (3.10). The results will be the same, but the derivation will give you another way of thinking about the equilibrium.

- Note first that *consumption and saving decisions are one and the same:* Given their disposable income, once consumers have chosen consumption, their saving is determined, and vice versa. The way we specified consumption behavior implies that private saving is given by:

$$\begin{aligned} S &= Y - T - C \\ &= Y - T - c_0 - c_1(Y - T) \end{aligned}$$

Rearranging, we get

$$S = -c_0 + (1 - c_1)(Y - T) \tag{3.11}$$

- In the same way that we called c_1 the propensity to consume, we can call $(1 - c_1)$ the **propensity to save**. The propensity to save tells us how much of an additional unit of income people save. The assumption we made previously—that the propensity to consume (c_1) is between zero and one implies that the propensity to save $(1 - c_1)$ is also between zero and one. Private saving increases with disposable income, but by less than one dollar for each additional dollar of disposable income.

  In equilibrium, investment must be equal to saving, the sum of private and public saving. Replacing private saving in equation (3.10) by its expression,

$$I = -c_0 + (1 - c_1)(Y - T) + (T - G)$$

Solving for output,

$$Y = \frac{1}{1 - c_1}[c_0 + \bar{I} + G - c_1 T] \tag{3.12}$$

Equation (3.12) is exactly the same as equation (3.8). This should come as no surprise. We are looking at the same equilibrium condition, just in a different way. This alternative way will prove useful in various applications later in the book. The Focus box "The Paradox of Saving" looks at such an application, which was first emphasized by Keynes and is often called the paradox of saving.

3-5 Is the Government Omnipotent? A Warning

Equation (3.8) implies that the government, by choosing the level of spending (G) or the level of taxes (T), can choose the level of output it wants. If it wants output to be higher by, say, \$1 billion, all it needs to do is to increase G by $\$(1 - c_1)$ billion. This increase in government spending, in theory, will lead to an output increase of $\$(1 - c_1)$ billion times the multiplier $1/(1 - c_1)$, or \$1 billion.

Can governments really achieve the level of output they want? Obviously not: If they could, and it was as easy as it sounds in the previous paragraph, why would the U.S. government have allowed growth to stall in 2008 and output to actually fall in 2009? Why wouldn't the government increase the growth rate now, so as to decrease unemployment more rapidly? There are many aspects of reality that we have not yet incorporated in our model, and all of them complicate the government's task. We shall introduce them in due time. But it is useful to list them briefly here:

For a glimpse at the longer list, go to Section 22-1, "What We Have Learned," in Chapter 22.

- Changing government spending or taxes is not easy. Getting the U.S. Congress to pass bills always takes time, often becoming a president's nightmare (Chapters 21 and 22).

The Paradox of Saving

FOCUS

As we grow up, we are told about the virtues of thrift. Those who spend all their income are condemned to end up poor. Those who save are promised a happy life. Similarly, governments tell us, an economy that saves is an economy that will grow strong and prosper! The model we have seen in this chapter, however, tells a different and surprising story.

Suppose that, at a given level of disposable income, consumers decide to save more. In other words, suppose consumers decrease c_0, therefore decreasing consumption and increasing saving at a given level of disposable income. What happens to output and to saving?

Equation (3.12) makes it clear that equilibrium output decreases: As people save more at their initial level of income, they decrease their consumption. But this decreased consumption decreases demand, which decreases production.

Can we tell what happens to saving? Let's return to the equation for private saving, equation (3.11) (recall that we assume no change in public saving, so saving and private saving move together):

$$S = -c_0 + (1 - c_1)(Y - T)$$

On the one hand, $-\mathbf{c_0}$ is higher (less negative): Consumers are saving more at any level of income; this tends to increase saving. But, on the other hand, their income Y is lower: This decreases saving. The net effect would seem to be ambiguous. In fact, we can tell which way it goes:

To see how, go back to equation (3.10), the equilibrium condition that investment and saving must be equal:

$$I = S + (T - G)$$

By assumption, investment does not change: $I = \bar{I}$. Nor do T or G. So the equilibrium condition tells us that in equilibrium, private saving S cannot change either. Although people want to save more at a given level of income, their income decreases by an amount such that their saving is unchanged.

This means that as people attempt to save more, the result is both a decline in output and unchanged saving. This surprising pair of results is known as the ***paradox of saving*** (or the *paradox of thrift*). Note that the same result would obtain if we looked at public rather than private saving: A decrease in the budget deficit would also lead to a lower output and unchanged overall (public and private) saving. And note that, if we extended our model to allow investment to decrease with output (we shall do this in Chapter 5) rather than assuming it is constant, the result would be even more dramatic: An attempt to save more, either by consumers or by the government, would lead to lower output, lower investment, and by implication lower saving!

So should you forget the old wisdom? Should the government tell people to be less thrifty? No. The results of this simple model are of much relevance in the short run. The desire of consumers to save more is an important factor in many of the U.S. recessions, including, as we saw in the previous Focus box, the recent crisis. But—as we will see later when we look at the medium run and the long run—other mechanisms come into play over time, and an increase in the saving rate is likely to lead over time to higher saving and higher income. A warning remains, however: Policies that encourage saving might be good in the medium run and in the long run, but they can lead to a reduction in demand and in output, and perhaps even a recession, in the short run.

- We have assumed that investment remained constant. But investment is also likely to respond in a variety of ways. So are imports: Some of the increased demand by consumers and firms will not be for domestic goods but for foreign goods. The exchange rate may change. All these responses are likely to be associated with complex, dynamic effects, making it hard for governments to assess the effects of their policies with much certainty (Chapters 5 and 9, and 18 to 20).
- Expectations are likely to matter. For example, the reaction of consumers to a tax cut is likely to depend on whether they think of the tax cut as transitory or permanent. The more they perceive the tax cut as permanent, the larger will be their consumption response. Similarly, the reaction of consumers to an increase in spending is likely to depend on when they think the government will raise taxes to pay for the spending (Chapters 14 to 16).
- Achieving a given level of output can come with unpleasant side effects. Trying to achieve too high a level of output can, for example, lead to increasing inflation and, for that reason, be unsustainable in the medium run (Chapter 9).
- Cutting taxes or increasing government spending, as attractive as it may seem in the short run, can lead to large budget deficits and an accumulation of public debt. A large debt has adverse effects in the long run. This is a hot issue in almost every advanced country in the world (Chapters 9, 11, 16, and 22).

In short, the proposition that, by using fiscal policy, the government can affect demand and output in the short run is an important and correct proposition. But as we refine our analysis, we will see that the role of the government in general, and the successful use of fiscal policy in particular, become increasingly difficult: Governments will never again have it so good as they have had in this chapter.

Summary

What you should remember about the components of GDP:

- GDP is the sum of consumption, investment, government spending, inventory investment, and exports minus imports.
- Consumption (C) is the purchase of goods and services by consumers. Consumption is the largest component of demand.
- Investment (I) is the sum of nonresidential investment—the purchase of new plants and new machines by firms—and of residential investment—the purchase of new houses or apartments by people.
- Government spending (G) is the purchase of goods and services by federal, state, and local governments.
- Exports (X) are purchases of U.S. goods by foreigners. Imports (IM) are purchases of foreign goods by U.S. consumers, U.S. firms, and the U.S. government.
- Inventory investment is the difference between production and purchases. It can be positive or negative.

What you should remember about our first model of output determination:

- In the short run, demand determines production. Production is equal to income. Income in turn affects demand.
- The consumption function shows how consumption depends on disposable income. The propensity to consume describes how much consumption increases for a given increase in disposable income.
- Equilibrium output is the level of output at which production equals demand. In equilibrium, output equals autonomous spending times the multiplier. Autonomous spending is that part of demand that does not depend on income. The multiplier is equal to $1/(1 - c_1)$, where c_1 is the propensity to consume.
- Increases in consumer confidence, investment demand, government spending, or decreases in taxes all increase equilibrium output in the short run.
- An alternative way of stating the goods-market equilibrium condition is that investment must be equal to saving—the sum of private and public saving. For this reason, the equilibrium condition is called the *IS* relation (*I* for investment, *S* for saving).

Key Terms

consumption (C), 68
investment (I), 68
fixed investment, 68
nonresidential investment, 68
residential investment, 68
government spending (G), 69
government transfers, 69
exports (X), 69
imports (IM), 69
net exports ($X - IM$), 69
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Questions and Problems

QUICK CHECK

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1. Using the information in this chapter, label each of the following statements true, false, or uncertain. Explain briefly.

a. The largest component of GDP is consumption.
b. Government spending, including transfers, was equal to 18.1% of GDP in 2014.
c. The propensity to consume has to be positive, but otherwise it can take on any positive value.
d. One factor in the 2009 recession was a drop in the value of the parameter c_0.
e. Fiscal policy describes the choice of government spending and taxes and is treated as exogenous in our goods market model.
f. The equilibrium condition for the goods market states that consumption equals output.
g. An increase of one unit in government spending leads to an increase of one unit in equilibrium output.
h. An increase in the propensity to consume leads to a decrease in output.

2. The following equations refer to the goods market of an economy in billions of euros:

$$C = 480 + 0.5Y_D$$
$$I = 110$$
$$T = 70$$
$$G = 250$$

a. Solve for the goods market equilibrium.
b. Find equilibrium disposable income (Y_D).
c. Find equilibrium consumption (C).

3. Refer to the economy in Problem 2.

a. Calculate the private savings, public savings, and investment spending.
b. Calculate the multiplier and explain how it affects equilibrium output.
c. Suppose that the government decides to increase its spending from €250 billion to €300 billion. Find the equilibrium output, consumption, and disposable income. Why would the government decide to expand fiscal spending?

DIG DEEPER

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4. The balanced budget multiplier

For both political and macroeconomic reasons, governments are often reluctant to run budget deficits. Here, we examine whether policy changes in G and T that maintain a balanced budget are macroeconomically neutral. Put another way, we examine whether it is possible to affect output through changes in G and T so that the government budget remains balanced.

Start from equation (3.8).

a. By how much does Y increase when G increases by one unit?
b. By how much does Y decrease when T increases by one unit?
c. Why are your answers to parts and b different?

Suppose that the economy starts with a balanced budget: $G = T$. If the increase in G is equal to the increase in T, then the budget remains in balance. Let us now compute the balanced budget multiplier.

d. Suppose that G and T increase by one unit each. Using your answers to parts and b what is the change in equilibrium GDP? Are balanced budget changes in G and T macroeconomically neutral?
e. How does the specific value of the propensity to consume affect your answer to part a? Why?

5. Automatic stabilizers

In this chapter we have assumed that the fiscal policy variables G and T are independent of the level of income. In the real world, however, this is not the case. Taxes typically depend on the level of income and so tend to be higher when income is higher. In this problem, we examine how this automatic response of taxes can help reduce the impact of changes in autonomous spending on output.

Consider the following behavioral equations:

$$C = c_0 + c_1 Y_D$$
$$T = t_0 + t_1 Y$$
$$Y_D = Y - T$$

G and I are both constant. Assume that t_1 is between 0 and 1.

a. Solve for equilibrium output.
b. What is the multiplier? Does the economy respond more to changes in autonomous spending when t_1 is 0 or when t_1 is positive? Explain.
c. Why is fiscal policy in this case called an automatic stabilizer?

6. Balanced budget versus automatic stabilizers

It is often argued that a balanced budget amendment would actually be destabilizing. To understand this argument, consider the economy in Problem 5.

a. Solve for equilibrium output.
b. Solve for taxes in equilibrium.

Suppose that the government starts with a balanced budget and that there is a drop in c_0.

c. What happens to Y? What happens to taxes?
d. Suppose that the government cuts spending in order to keep the budget balanced. What will be the effect on Y? Does the cut in spending required to balance the budget counteract or reinforce the effect of the drop in c_0 on output? (Don't do the algebra. Use your intuition and give the answer in words.)

7. Taxes and transfers

Recall that we define taxes, T, as net of transfers. In other words,

$$T = \text{Taxes} - \text{Transfer Payments}$$

a. Suppose that the government increases transfer payments to private households, but these transfer payments are not financed by tax increases. Instead, the government

borrows to pay for the transfer payments. Show in a diagram (similar to Figure 3-2) how this policy affects equilibrium output. Explain.

b. Suppose instead that the government pays for the increase in transfer payments with an equivalent increase in taxes. How does the increase in transfer payments affect equilibrium output in this case?

c. Now suppose that the population includes two kinds of people: those with high propensity to consume and those with low propensity to consume. Suppose the transfer policy increases taxes on those with low propensity to consume to pay for transfers to people with high propensity to consume. How does this policy affect equilibrium output?

d. How do you think the propensity to consume might vary across individuals according to income? In other words, how do you think the propensity to consume compares for people with high income and people with low income? Explain. Given your answer, do you think tax cuts will be more effective at stimulating output when they are directed toward high-income or toward low-income taxpayers?

8. Investment and income

This problem examines the implications of allowing investment to depend on output. Chapter 5 carries this analysis much further and introduces an essential relation—the effect of the interest rate on investment—not examined in this problem.

a. Suppose the economy is characterized by the following behavioral equations:

$$C = c_0 + c_1 Y_D$$
$$Y_D = Y - T$$
$$I = b_0 + b_1 Y$$

Government spending and taxes are constant. Note that investment now increases with output. (Chapter 5 discusses the reasons for this relation.) Solve for equilibrium output.

b. What is the value of the multiplier? How does the relation between investment and output affect the value of the multiplier? For the multiplier to be positive, what condition must $(c_1 + b_1)$ satisfy? Explain your answers.

c. What would happen if $(c_1 + b_1) > 1$? (Trick question. Think about what happens in each round of spending).

d. Suppose that the parameter b_0, sometimes called *business confidence*, increases. How will equilibrium output be affected? Will investment change by more or less than the change in b_0? Why? What will happen to national saving?

EXPLORE FURTHER

9. The paradox of saving revisited

You should be able to complete this question without doing any algebra, although you may find making a diagram helpful for part a. For this problem, you do not need to calculate the magnitudes of changes in economic variables—only the direction of change.

a. Consider the economy described in Problem 8. Suppose that consumers decide to consume less (and therefore to save more) for any given amount of disposable income. Specifically, assume that consumer confidence (c_0) falls. What will happen to output?

b. As a result of the effect on output you determined in part a, what will happen to investment? What will happen to public saving? What will happen to private saving? Explain. (*Hint*: Consider the saving-equals-investment characterization of equilibrium.) What is the effect on consumption?

c. Suppose that consumers had decided to increase consumption expenditure, so that c_0 had increased. What would have been the effect on output, investment, and private saving in this case? Explain. What would have been the effect on consumption?

d. Comment on the following logic: "When output is too low, what is needed is an increase in demand for goods and services. Investment is one component of demand, and saving equals investment. Therefore, if the government could just convince households to attempt to save more, then investment, and output, would increase."

Output is not the only variable that affects investment. As we develop our model of the economy, we will revisit the paradox of saving in future chapter problems.

10. Greece's usage of fiscal policy to avoid the meltdown and the debt crisis

As a result of the combined effects of the global financial crisis and the sovereign debt crisis, the GDP of Greece declined from €281.44 billion in 2008 to €176.5 billion in 2015.

a. What is the percentage change of GDP during this period?

b. By how much should autonomous expenditure have risen in order to prevent the slide in the GDP of Greece, given that marginal propensity to consume is 0.6?

c. In reference to your reply to part (b), explain why the Greek Parliament refused the austerity measures that lender nations sanctioned for Greece.

d. The Greek reform program aimed to improve incentives to private investors. By how much do these incentives alone improve GDP if they have increased investment by €15.5 billion?

11. The "exit strategy" problem

In fighting the recession associated with the crisis, taxes were cut and government spending was increased. The result was a large government deficit. To reduce that deficit, taxes must be increased or government spending must be cut. This is the "exit strategy" from the large deficit.

a. How will reducing the deficit in either way affect the equilibrium level of output in the short run?

b. Which will change equilibrium output more: (i) cutting G by \$100 billion (ii) raising T by \$100 billion?

c. How does your answer to part (b) depend on the value of the marginal propensity to consume?

d. You hear the argument that a reduction in the deficit will increase consumer and business confidence and thus reduce the decline in output that would otherwise occur with deficit reduction. Is this argument valid?