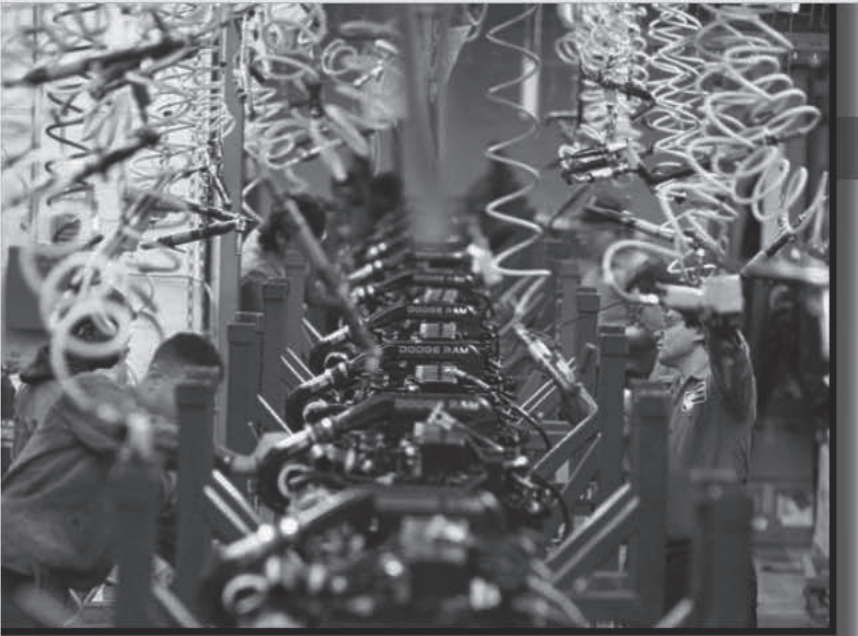

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CHAPTER 20

The Classical Long-Run Model

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MACROECONOMIC MODELS: CLASSICAL VERSUS KEYNESIAN

Classical model A macroeconomic model that explains the long-run behavior of the economy.

The **classical model,** developed by economists in the 19th and early 20th centuries, was an attempt to explain a key observation about the economy: Over periods of several years or longer, the economy performs rather well. That is, if we step back from conditions in any one year and view the economy over a long stretch of time, we see that it operates reasonably close to its potential output. And even when it deviates, it does not do so forever. Business cycles may come and go, but the economy eventually returns to full employment. Indeed, if we think in terms of decades rather than years or quarters, the business cycle fades in significance.

This is illustrated in Figure 1, which shows estimates of U.S. real GDP (in 1990 dollars) from 1820 through 2010. In the figure, real GDP is plotted with a *logarithmic scale*, so that equal vertical distances represent equal *percentage* changes rather than equal absolute changes. If real GDP grew at a constant percentage rate, the graph would be a perfectly straight line.

The startling feature of Figure 1 is how real GDP hovers near its long-run trend, and how insignificant even the most severe departures from that trend appear in the graph. Even the Great Depression of the 1930s appears as just a ripple, with real GDP returning back to the trend. And the severe recession that began in 2008 appears as a hard-to-notice slight bend away from the trend.

In the classical view, this behavior is no accident: Powerful forces are at work that drive the economy toward full employment. Many of the classical economists went even further, arguing that these forces could operate within a reasonably short period of time. And even today, an important group of macroeconomists continues to believe that the classical model is the foundation for explaining the economy's short-run behavior.

Until the Great Depression of the 1930s, there was little reason to question these classical ideas. True, output fluctuated around its trend, and from time to time there were serious recessions, but output always returned to its potential, full-employment level within a few years or less, just as the classical economists predicted. But during the Great Depression, output was stuck far below its potential for many years. For some reason, the economy wasn't working the way the classical model said it should.

FIGURE 1 U.S. Real GDP, 1820–2010 (Logarithmic Scale)

Source: Data for 1820–1990: Angus Maddison, *Contours of the World Economy*; Data for 1991–2010: The Conference Board, *Total Economy Database*.

Note: Data for 1820 to 1870 is interpolated between decades, hence the smoother appearance for those years.

In 1936, in the midst of the Great Depression, the British economist John Maynard Keynes offered an explanation for the economy's poor performance. His new model of the economy—soon dubbed the *Keynesian model*—changed many economists' thinking.[1] Keynes and his followers argued that, while the classical model might explain the economy's operation in the long run, the long run could be a very long time in arriving. In the meantime, production could be stuck below its potential, as it seemed to be during the Great Depression.

Keynesian ideas became increasingly popular in universities and government agencies during the 1940s and 1950s. By the mid-1960s, the entire profession had been won over: Macroeconomics *was* Keynesian economics, and the classical model was removed from virtually all introductory economics textbooks. You might be wondering, then, why we are bothering with the classical model here. After all, isn't it an older model of the economy, one that was largely discredited and replaced, just as the Ptolemaic view that the sun circled the earth was supplanted by the more modern, Copernican view? Not at all.

Why the Classical Model Is Important

The classical model retains its importance for two reasons. First, over the last several decades, there has been an active counterrevolution against Keynes's approach to

[1] Keynes's attack on the classical model was presented in his book *The General Theory of Employment, Interest and Money* (1936). Unfortunately, it's a very difficult book to read, though you may want to try. Keynes's assumptions were not always clear, and some of his text is open to multiple interpretations. As a result, economists have been arguing for decades about what Keynes really meant.

understanding the macroeconomy. Many of the counterrevolutionary new theories are based largely on classical ideas. By studying classical macroeconomics, you will be better prepared to understand the controversies centering on these newer schools of thought.

The second—and more important—reason for us to study the classical model is that it remains the best model for understanding the economy over the long run. Even the many economists who find the classical model inadequate for understanding the economy in the short run find it extremely useful in analyzing the economy in the long run.

> *Keynes's ideas and their further development help us understand economic fluctuations—movements in output around its long-run trend. But the classical model has proven more useful in explaining the long-run trend itself.*

This is why we will use the terms "classical view" and "long-run view" interchangeably in the rest of the book; in either case, we mean "the ideas of the classical model used to explain the economy's long-run behavior."

Assumptions of the Classical Model

Remember from Chapter 1 that all models begin with *assumptions* about the world. The classical model is no exception. Many of its assumptions are *simplifying;* they make the model more manageable, enabling us to see the broad outlines of economic behavior without getting lost in the details. Typically, these assumptions involve aggregation. We combine the many different interest rates in the economy and refer to a single interest rate. We combine the many different types of labor in the economy into a single aggregate labor market. These simplifications are usually harmless: Adding more detail would make our work more difficult, but it would not add much insight; nor would it change any of the central conclusions of the classical view.

There is, however, one assumption in the classical model that goes beyond mere simplification. This is an assumption about how the world works, and it is *critical* to the conclusions we will reach in this and the next chapter. We can state it in two words: *Markets clear.*

> *A critical assumption in the classical model is that* ***markets clear:*** *The price in every market will adjust until quantity supplied and quantity demanded are equal.*

Market clearing Adjustment of prices until quantities supplied and demanded are equal.

Does the market-clearing assumption sound familiar? It should: It was the basic idea behind our study of supply and demand. When we look at the economy through the classical lens, we assume that the forces of supply and demand work fairly well throughout the economy and that markets do reach equilibrium. An excess supply of anything traded will lead to a fall in its price; an excess demand will drive the price up.

The market-clearing assumption, which permeates classical thinking about the economy, provides an early hint about why the classical model does a better job over longer time periods (several years or more) than shorter ones. In some markets, prices might not fully adjust to their equilibrium values for many months or even years after some change in the economy. An excess supply or excess demand might persist for some time. Still, if we wait long enough, an excess supply in a market will eventually force the price down, and an excess demand will eventually drive the price up. That is, *eventually,* the market will clear. Therefore, when we are trying to explain the economy's behavior over the long run, market clearing seems to be a reasonable assumption.

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How Much Output Will We Produce?

Over the three years from 2005 through 2007 (just before our most recent recession began), the U.S. economy produced an average of about $13 trillion worth of goods and services per year (valued in 2005 dollars). How was this average level of output determined? Why didn't production average $18 trillion per year? Or just $6 trillion? There are so many things to consider when answering this question, variables you constantly hear about in the news: wages, interest rates, investment spending, government spending, taxes, and more. Each of these concepts plays an important role in determining total output, and our task in this chapter is to show how they all fit together.

[redacted]

The classical approach is to start at the beginning, with the *reason* for all this production in the first place: our desire for goods and services, and our need for income in order to buy them. In a market economy, people get their income from supplying labor and other resources to firms. Firms, in turn, use these resources to make the goods and services that people demand. Thus, a logical place to start our analysis is the markets for resources: labor, land, capital, and entrepreneurship.

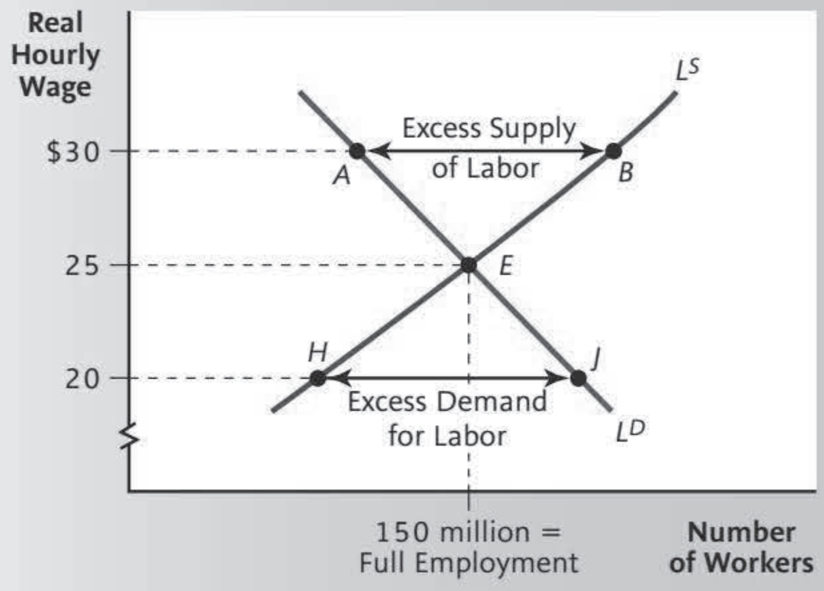
For now we'll concentrate our attention on just one type of resource: labor. We'll assume that firms are already using the available quantities of the other resources. Moreover, because we are building a *macroeconomic* model, we'll aggregate all the different types of labor—office workers, construction workers, factory workers, teachers, waiters, writers, and more—into a single variable, simply called *labor.*

Our question is: How many workers will be employed in the economy?

The Labor Market

Consider the economy of a fictional country called Classica, in which all workers have the same skills. Classica's labor market is illustrated in Figure 2. The number of workers is measured on the horizontal axis, and the real hourly wage rate is measured on the vertical axis. Remember that the *real wage*—which is measured in the dollars of some base year—tells us the amount of goods that workers can buy with an hour's earnings.

FIGURE 2 **The Labor Market**



The equilibrium wage rate of $25 per hour is determined at point E, where the upward-sloping labor supply curve crosses the downward-sloping labor demand curve. At any other wage, an excess demand or excess supply of labor will cause an adjustment back to equilibrium.

Now look at the two curves in the figure. These are supply and demand curves, similar to the supply and demand curves for maple syrup, but there is one key difference: For a *good* such as maple syrup, households are the demanders and firms the suppliers. But for labor, the roles are reversed: Households supply labor and firms demand it. Let's take a closer look at each of these curves in Classica's labor market.

Labor Supply

The curve labeled L^S is Classica's aggregate **labor supply curve;** it tells us how many people in the country will want to work at each wage rate. The upward slope tells us that the greater the real wage, the greater the number of people who will want to work. Why does the labor supply curve slope upward?

Labor supply curve Indicates how many people will want to work at various real wage rates.

Think about yourself. To earn income, you must go to work and give up other activities such as going to school, exercising, or just hanging out with your friends. You will want to work only if the income you will earn *at least* compensates you for the other activities that you will give up.

Of course, people value their time differently. But for each of us, there is some critical wage rate above which we would decide that we're better off working. Below that wage, we would be better off not working. In Figure 2,

the labor supply curve slopes upward because, as the wage rate increases, more and more individuals decide they are better off working than not working. Thus, a rise in the wage rate increases the number of people in the economy who want to work—to supply their labor.

Labor Demand

The curve labeled L^D is the **labor demand curve,** which shows the number of workers Classica's firms will want to hire at any real wage. Why does this curve slope downward?

Labor demand curve Indicates how many workers firms will want to hire at various real wage rates.

In deciding how much labor to hire, a firm's goal is to earn the greatest possible profit: the difference between sales revenue and costs. Each time a firm in Classica hires another worker, output rises, and the firm can get more revenue by selling that worker's output. But most types of production are characterized by *diminishing returns to labor*: the rise in output (and the revenue the firm gets from selling it) gets smaller and smaller with each successive worker.

Why are there diminishing returns to labor? For one thing, as we keep adding workers, further gains from specialization are harder to achieve. Moreover, as we continue to add workers, each one will have less and less of the other resources to work with. For example, each time more agricultural workers are added to a fixed amount of farmland, output might rise. But as we continue to add workers and there are more workers per acre, output will rise by less and less with each new worker. The same is true when more factory workers are added to a fixed amount of factory floor space and machinery, or more professors are added to a fixed number of classrooms: Output continues to rise, but by less and less with each added worker.

So let's recap: Each additional worker causes a firm's output and revenue to rise, but by less and less for each new worker. Also, each additional worker adds to the firm's costs. A firm will want to keep hiring additional workers as long as they add to the firm's profit, that is, as long as they add more to revenue than they add to cost.

Now think about what happens as the wage rate rises. Some workers that added more to revenue than to cost at the lower wage will now cost more than they add in revenue. Accordingly, the firm will not want to employ these workers at the higher wage.

As the wage rate increases, each firm in the economy will find that, to maximize profit, it should employ fewer workers than before. When all firms behave this way together, a rise in the wage rate will decrease the quantity of labor demanded in the economy.

Equilibrium Total Employment

Remember that in the classical model, we assume that *all markets clear,* and that includes the market for labor. Specifically, the real wage adjusts until the quantities of labor supplied and demanded are equal. In the labor market in Figure 2, the market-clearing wage is $25 per hour because that is where the labor supply and labor demand curves intersect. While every worker would prefer to earn $30 rather than $25, at $30 there would be an excess supply of labor equal to the distance *AB*. With not enough jobs to go around, competition among workers would drive the wage downward. Similarly, firms might prefer to pay their workers $20 rather than $25, but at $20, the excess demand for labor (equal to the distance *HJ*) would drive the wage upward. When the wage is $25, however, there is neither an excess demand nor an excess supply of labor, so the wage will neither increase nor decrease. Thus, $25 is the equilibrium wage in the economy. Reading along the horizontal axis, we see that at this wage, 150 million people in Classica will be working.

Notice that, in the figure, labor is fully employed; that is, the number of workers that firms want to hire is equal to the number of people who want jobs. Therefore, everyone who wants a job at the market wage of $25 should be able to find one. Small amounts of frictional unemployment might exist, since it takes some time for new workers or job switchers to find jobs. And there might be structural unemployment, due to some mismatch between those who want jobs in the market and the types of jobs available. But there is no *cyclical* unemployment of the type we discussed two chapters ago.

Full employment of the labor force is an important feature of the classical model. As long as we can count on markets (including the labor market) to clear, government action is not needed to ensure full employment; it happens automatically:

In the classical model, the economy achieves full employment on its own.

Automatic full employment may strike you as odd, since it contradicts the cyclical unemployment we sometimes see around us. For example, in our most recent recession and the slump that followed, millions of workers around the country, in all kinds of professions and labor markets, were unable to find jobs. Remember, though, that the classical model takes the long-run view, and over long periods of time (a period of many years), full employment is a fairly accurate description of the U.S. labor market. Cyclical unemployment, by definition, lasts only as long as the current business cycle itself; it is not a permanent, long-run problem.

From Employment to Output

So far, we've focused on Classica's labor market to determine its level of employment. In our example, 150 million people will have jobs. Now we ask: How much output (real GDP) will these 150 million workers produce? The answer depends on two things: (1) the amount of other resources available for labor to use; and (2) the state of *technology*, which determines how much output we can produce with those resources.

In this chapter, remember that we're focusing on only one resource—labor—and we're treating the quantities of all other resources firms use as fixed during the period we're analyzing. Now we'll go even further: We'll assume that technology does not change.

Why do we make these assumptions? After all, in the real world technology *does* change, the capital stock *does* grow, new natural resources *can* be discovered, and the number and quality of entrepreneurs *can* change. Isn't it unrealistic to hold all of these things constant?

Yes, but our assumption is only temporary. The most effective way to master a macroeconomic model is "divide and conquer": Start with a part of the model, understand it well, and then add in other parts. Accordingly, our classical analysis of the economy is divided into two separate questions: (1) What would be the long-run equilibrium of the economy *if* there were a constant state of technology and *if* quantities of all resources besides labor were fixed? And (2) What happens to this long-run equilibrium when technology and the quantities of other resources change? In this chapter, we focus on the first question. In the next chapter on economic growth, we'll address the second question.

The Production Function

With a constant technology, and given quantities of all resources other than labor, only one variable can affect total output: the quantity of labor. So it's time to explore the relationship between total employment and total production in the economy. This relationship is given by the economy's *aggregate production function*.

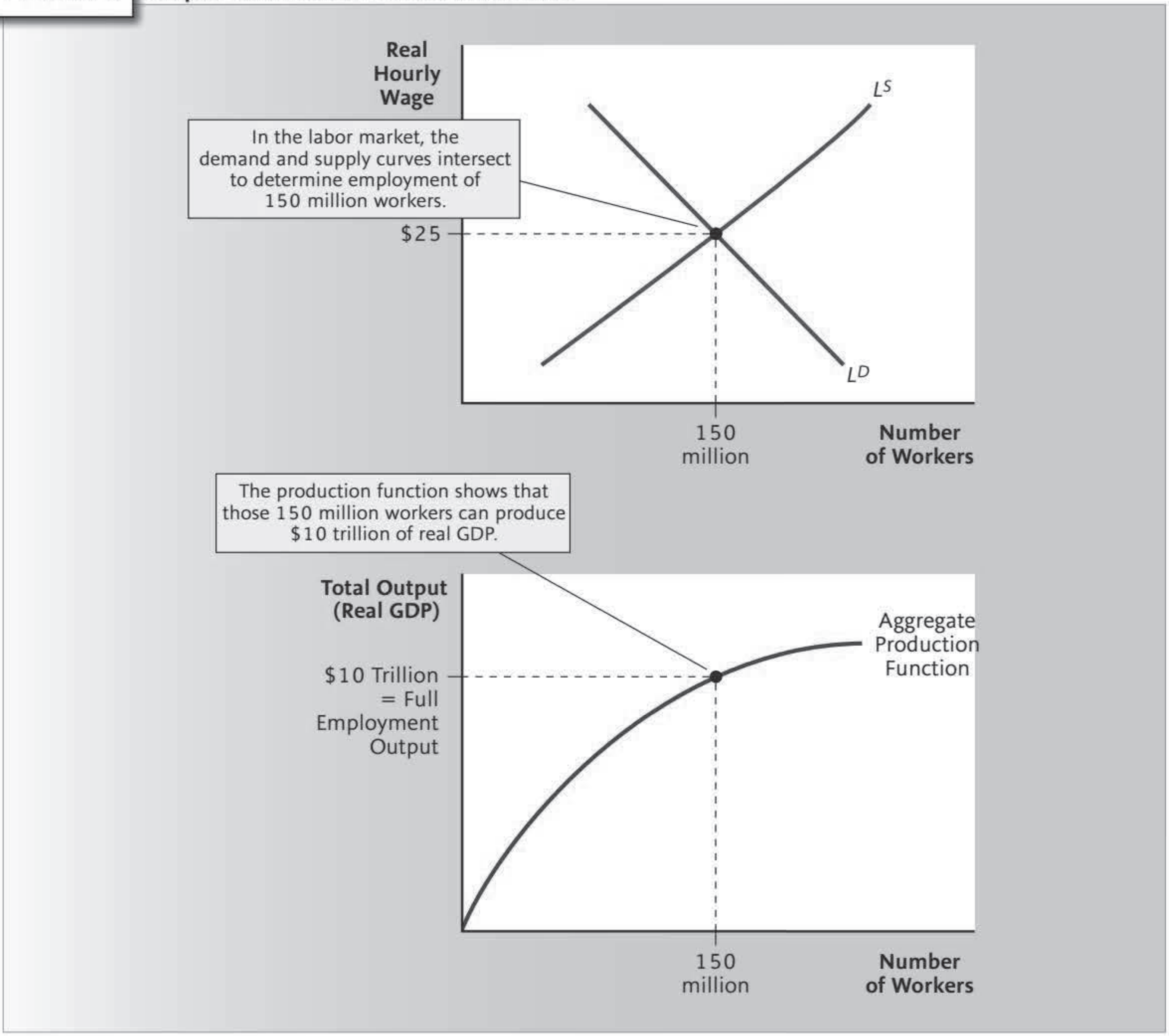
> *The **aggregate production function** (or just **production function**) shows the total output the economy can produce with different quantities of labor, given constant amounts of other resources and the current state of technology.*

Aggregate production function The relationship showing how much total output can be produced with different quantities of labor, when quantities of all other resources and technology are held constant.

The bottom panel of Figure 3 shows Classica's aggregate production function. The upward slope tells us that an increase in the number of people working will increase the quantity of output produced. But notice the shape of the production function: It flattens out as we move rightward along it.

The declining slope of the aggregate production function is the result of the *diminishing returns to labor* that we discussed earlier: At each firm in Classica—and in the country as a whole—output rises when another worker is added, but the rise is smaller with each successive worker.

FIGURE 3 **Output Determination in the Classical Model**



Equilibrium Real GDP

The two panels of Figure 3 illustrate how the aggregate production function, together with the labor market, determine Classica's total output or real GDP. The labor market (upper panel) automatically generates full employment of 150 million workers, and the production function (lower panel) tells us that 150 million workers—together with the available amounts of other resources and the current state of technology—can produce $10 trillion worth of output. Because $10 trillion is the output produced by a fully employed labor force, it is also the economy's potential output level.

In the classical, long-run view, the economy reaches its potential output automatically.

This last statement is an important conclusion of the classical model and an important characteristic of the economy in the long run: Output tends toward its potential, full-employment level *on its own,* with no need for government to steer the economy toward it. And we have arrived at this conclusion merely by assuming that the labor market clears and observing the relationship between employment and output.

THE ROLE OF SPENDING

Something may be bothering you about the classical view of output determination, an issue we have so far carefully avoided: What if business firms are unable to *sell* all the output that a fully employed labor force produces? Firms won't continue making goods they can't sell, so they would have to decrease production and employ fewer workers. The economy would not remain at full employment for very long.

Thus, if we are asserting that equilibrium total output is *potential* output, we had better be sure there is enough spending to buy all of the output produced. But can we be sure of this?

In the classical view, the answer is an unequivocal "yes." We'll demonstrate this in two stages: first, with some very simple (but unrealistic) assumptions, and then, under more realistic conditions.

Total Spending in a Very Simple Economy

Imagine an economy much simpler than our own, with just two types of economic units: domestic households and domestic business firms. Households spend all of their income (they do not save) and households are the only spenders in the economy. There is no government collecting taxes or purchasing goods; no business investment; and no imports from or exports to other countries.

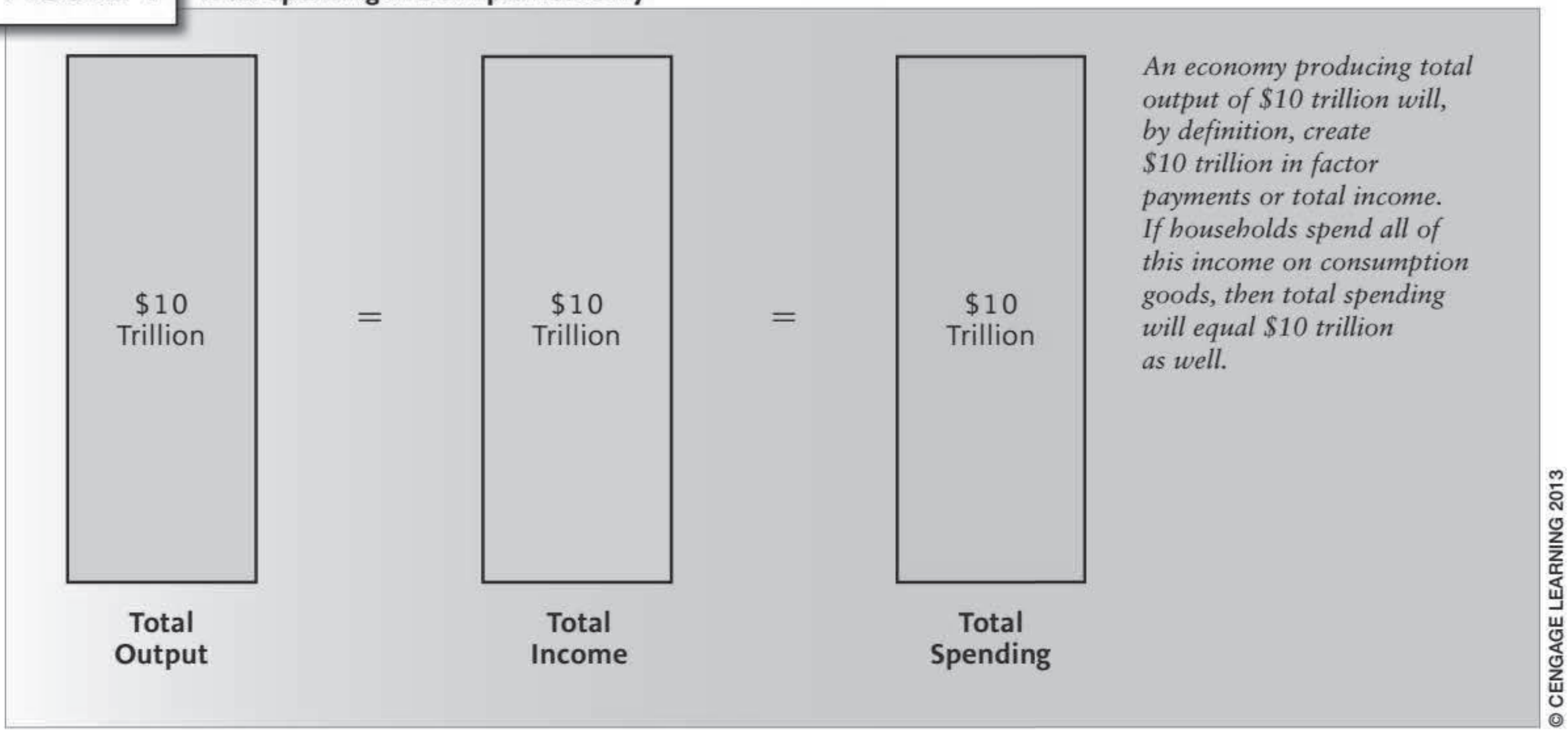
Production, income, and spending in this economy are illustrated in Figure 4. During the year, firms produce the economy's potential output, assumed to be $10 trillion in the figure. This is represented by the size of the first rectangle.

Next we ask: how much income will households earn during the year? As you learned two chapters ago, the value of the economy's total output is equal to the total income (factor payments) of households. So with firms producing $10 trillion in output, they must also pay out $10 trillion to households in the form of wages, rent, interest, and profit. This total income is represented by the second rectangle.

Now, we ask our final question: What is total spending? Because we assume that households spend all of their income, and no sector other than households buys goods and services, we have an easy answer: Total spending is the same as total consumption spending, which must be the same as household income: $10 trillion. Total spending is represented by the third rectangle. As you can see, all three rectangles are the same size and represent the same value: $10 trillion. So total spending (the last rectangle) is equal to total output (the first rectangle).

> *In a simple economy with just domestic households and firms, in which households spend all of their income on domestic output, total spending must be equal to total output.*

FIGURE 4 Total Spending in a Simple Economy



Say's Law

Say's law The idea that total spending will be sufficient to purchase the total output produced.

The idea that total spending will equal total output is called **Say's law,** after the early 19th-century economist Jean Baptiste Say, who popularized it. As you'll soon see, Say's law can apply not just to our overly simple economy, but to a more realistic one as well. For now, let's stay with the simple case.

Say noted that each time a good or service is produced, an equal amount of income is created. Thus, the act of producing a good creates the very income that is needed to purchase the good.

In Say's own words:

> *A product is no sooner created than it, from that instant, affords a market for other products to the full extent of its own value. . . . Thus, the mere circumstance of the creation of one product immediately opens a vent for other products.*[2]

For example, each time a shirt manufacturer produces a $25 shirt, it creates $25 in factor payments to households. (Forgot why? Go back two chapters and refresh your memory about the factor payments approach to GDP.) But in the simple economy we're analyzing, that $25 in factor payments will lead to $25 in total spending—just enough to buy the very shirt produced. Of course, the households who receive the $25 in factor payments won't necessarily buy a shirt with it; the shirt manufacturer must still worry about selling its own specific output. But in the *aggregate,* we needn't worry about there being sufficient demand for the total output produced. Business firms—by producing output—also create a demand for goods and services equal to the value of that output.

> *Say's law states that by producing goods and services, firms create a total demand for goods and services equal to what they have produced. Or, more simply, supply creates its own demand.*

[2] J. B. Say, *A Treatise on Political Economy,* 4th ed. (London: Longman, 1821), Vol. I, p. 167.

Say's law is crucial to the classical view of the economy. Why? Remember that because the labor market is assumed to clear, firms will hire all the workers who want jobs and produce our *potential* or *full-employment* output level. But firms will be able to *continue* producing this level of output only if they can *sell* it all. In the simple economy of Figure 4, Say's law assures us that, in the aggregate, spending will be just high enough for firms to sell all the output that a fully employed labor force can produce. As a result, full employment can be maintained.

But the economy in Figure 4 leaves out some important details of economies in the real world. Does Say's law also apply in a more realistic economy? Let's see.

Total Spending in a More Realistic Economy

The real-world economy is more complicated than the imaginary one we've just considered. One complication is trade with the rest of the world. We'll deal with the foreign sector and international trade in the appendix to this chapter. For now, we'll continue to assume that we're in a *closed economy*—one that does not have any economic dealings with the rest of the world. But here we'll add a few features that we ignored before.

In particular, we'll now assume:

- A *government* collects taxes and purchases goods and services.
- Households no longer spend their entire incomes on consumption. Instead, some is used to pay *taxes*, and some is *saved*.
- Business firms purchase capital goods (investment spending).

With these added details, will Say's law still apply? Can we have confidence that total spending will equal total output? To answer, let's go back to our fictional economy of Classica, which has the labor market and aggregate production function you saw earlier in Figure 2. But now we'll add the details we've just listed.

Data on Classica's economy in 2012 are given in Table 1. Classica's potential (full-employment) output is \$10 trillion, and, because it behaves according to the classical model, that is what Classica actually produces during the year. Notice that total output and total income are each equal to \$10 trillion in 2012.

Next come three entries that refer to spending by the final users who purchase Classica's GDP. Note that, unlike the households in Figure 4, Classica's households spend only *part* of their income, \$7 trillion, on consumption goods (C). Skipping down to government purchases (G), we find that Classica's government sector buys \$2 trillion in goods and services.

In addition to consumption and government purchases—with which you are already familiar—Table 1 includes some new variables. Because these will be used throughout the rest of this book, it's worth defining and discussing them here.

TABLE 1

Flows in the Economy of Classica, 2012

Actual and Potential Output (GDP)	\$10 trillion
Total Income	\$10 trillion
Consumption Spending (C)	\$7 trillion
Planned Investment Spending (I^P)	\$1 trillion
Government Purchases (G)	\$2 trillion
Net Taxes (T)	\$1.25 trillion
Disposable Income	\$8.75 trillion
Household Saving (S)	\$1.75 trillion

Planned Investment Spending (I^P)

Our ultimate goal is to find out if Say's law works in Classica—if total spending matches total output, so that firms in Classica will be able to sell all that they produce. Thus, when we measure total spending, we want to include only the spending that decision makers *want* to do, and will likely *continue* to do. Consumption spending, for example, is virtually always intentional. In *The Simpsons,* Homer would sometimes wake up and "discover" that he had purchased a new car or a lifetime supply of Slurpees. But in real life, that doesn't happen very often. The same is true of *most* investment spending. Businesses don't "discover" that they've purchased a new factory: they intend to purchase it, and usually plan to do so well in advance.

But inventory changes—a component of investment in GDP—are often *un*intentional, and can come as a surprise to firms. They occur when firms sell less than they've produced (an increase in inventories) or more than they've produced (a decrease in inventories). It would be a mistake to include unintended inventory changes—which represent the mismatch between sales and production—when we measure the economy's total spending. On the contrary, we want to *exclude* unintended inventory changes from our measure of spending.

To keep our discussion simple, we'll treat *all* inventory changes as if they are unintentional (even though, in reality, some inventory changes are intended). So when we calculate total spending, we'll exclude *all* inventory changes from the spending of business firms (investment). When we subtract inventory changes from investment, we're left with the economy's *planned investment spending.*

Planned investment spending Business purchases of plant and equipment.

Planned investment spending (I^P) *over a period of time is total investment* (I) *minus the change in inventories over the period:*

$$I^P = I - \Delta \text{ inventories.}$$

Here, we're using the Greek letter Δ ("delta") to indicate a change in a variable. In Table 1, you can see that Classica's planned investment spending—which excludes any changes in inventories—is $1 trillion.

Net Tax Revenue (T)

Recall (from two chapters ago) that *transfer payments* are government outlays that are *not* spent on goods and services. These transfers—which include unemployment insurance, welfare payments, and Social Security benefits—are just *given* to people, either out of social concern (welfare payments), to keep a promise (Social Security payments), or elements of both (unemployment insurance).

In the macroeconomy, government transfer payments are like negative taxes: They represent the part of tax revenue that the government gives right back to households (such as Social Security recipients). This revenue is not available for government purchases. Because transfer payments stay *within* the household sector, we can treat them as if they were never collected by the government at all. We do this by focusing on *net taxes:*

Net taxes Government tax revenues minus transfer payments.

Net taxes (T) *are total government tax revenue minus government transfer payments:*

$$T = \text{Total tax revenue} - \text{Transfers.}$$

From the table, Classica's net taxes in 2012 are $1.25 trillion. This number might result from total tax revenue of $2 trillion and $0.75 trillion in government transfer payments. It could also result from $3 trillion in tax revenue and

$1.75 trillion in transfers. From the macroeconomic perspective, it makes no difference: Net taxes are $1.25 trillion in either case.

Disposable Income

Disposable income is the income households have left after net taxes are taken away. We call it disposable income, because it represents the part of income that households are free to "dispose" of as they wish.

Disposable income Household income minus net taxes, which is either spent or saved.

Disposable Income = Total Income − Net Taxes

In Classica, total income is $10 trillion and net taxes are $1.25 trillion, so disposable income is $10 trillion − $1.25 trillion = $8.75 trillion.

Household Saving (S)

Households can do only two things with their disposable income: spend it or save it. The part that is spent is the *consumption spending (C)* component of GDP. Therefore, the remainder of disposable income must be saved.

Household saving *(S) = Disposable Income − C*

(Household) saving The portion of after-tax income that households do not spend on consumption.

In the table, Classica's household saving is listed as $1.75 trillion. But this number follows from the other numbers listed above it. In particular, because disposable income is $8.75 trillion, and consumptions spending is $7 trillion, our formula tells us that S = $8.75 trillion − $7 trillion = $1.75 trillion.

Total Spending in Classica

In Classica, total spending is the sum of the purchases made by the household sector (C), the business sector (I^p), and the government sector (G):

$$\text{Total spending} = C + I^p + G.$$

Or, using the numbers in Table 1:

$$\text{Total spending} = \$7 \text{ trillion} + \$1 \text{ trillion} + \$2 \text{ trillion} = \$10 \text{ trillion}.$$

This may strike you as suspiciously convenient: Total spending is exactly equal to total output, just as we'd like it to be if we want Classica to continue producing its potential output of $10 trillion. And just what we needed to illustrate Say's law in this more realistic economy.

But we haven't yet proven anything; we've just cooked up an example that made the numbers come out this way. The question is, do we have any reason to *expect* the economy to give us numbers like these automatically, with total spending precisely equal to total output?

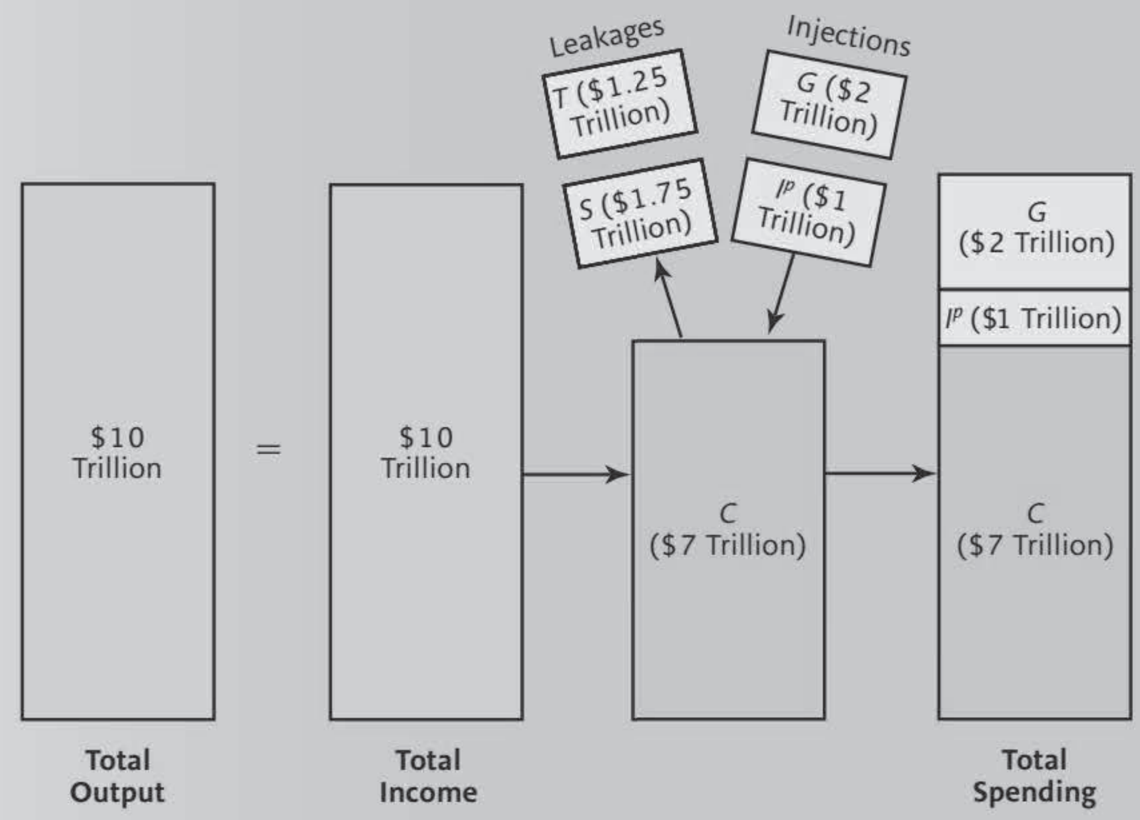
The rectangles in Figure 5 can help us answer this question. Total output (represented by the first rectangle) is, by definition, always equal in value to total income (the second rectangle). As we've seen in Figure 4, if households *spent* all of this income, then consumption spending would equal total output.

But in Classica, households do *not* spend all of their income. Some income goes to pay net taxes ($1.25 trillion), and some is saved ($1.75 trillion). We can think of saving and net taxes as **leakages** out of spending: income that households receive, but do not spend on Classica's output. Leakages reduce consumption spending below total income, as you can see in the third, lower rectangle. In Classica, total leakages = $1.75 trillion + $1.25 trillion = $3 trillion, and this must be subtracted

Leakages Income earned by households that they do *not* spend on the country's output during a given year.

FIGURE 5 **Leakages and Injections**

By definition, total output equals total income. Leakages—net taxes (T) *and saving* (S)*—reduce consumption spending below total income. Injections—government purchases* (G) *plus planned investment spending* (I^P)*—contribute to total spending. When leakages equal injections, total spending equals total output.*



from income of $10 trillion to get consumption spending of $7 trillion. Thus, if consumption spending were the only spending in the economy, business firms would be unable to sell their entire potential output of $10 trillion.

Injections Spending on a country's output from sources other than its households.

Fortunately, in addition to leakages, there are **injections**—spending from sources *other* than households. Injections boost total spending and enable firms to produce and sell a level of output greater than just consumption spending.

There are two types of injections in the economy. First is the government's purchases of goods and services. When government agencies—federal, state, or local—buy aircraft, cleaning supplies, cell phones, or computers, they are buying a part of the economy's output.

The other injection is planned investment spending (I^p). When business firms purchase new computers, trucks, or machinery, or they build new factories or office buildings, they are buying a part of the GDP along with consumers and the government.

Take another look at the rectangles in Figure 5. Notice that in going from total output to total spending, leakages are subtracted and injections are added. Clearly, total output and total spending will be equal only if leakages and injections are equal as well.

> *Total spending will equal total output if and only if total leakages in the economy are equal to total injections—that is, only if the sum of saving and net taxes* (S + T) *is equal to the sum of planned investment spending and government purchases* (I^P + G).

And here is a surprising result: In the classical model, this condition will automatically be satisfied. To see why, we must first take a detour through another important market. Then we'll come back to the equality of leakages and injections.

The Loanable Funds Market

The **loanable funds market** is where the economy's saving is made available to those who need additional funds. In the complex real world, households, businesses, government, and the foreign sector can all supply funds to this market. And the funds can be provided to a variety of entities as well: other households (that need funds to buy a home or car), businesses (that need funds to buy capital equipment), government (which often spends more than it collects in taxes), or other countries.

Loanable funds market The market in which savers make their funds available to borrowers.

To keep our discussion simple, we'll assume that just one sector of the economy saves and *supplies* funds to the loanable funds market: the household sector. And we'll assume that only two sectors *demand* loanable funds: business firms and the government.

The Supply of Loanable Funds

Households can supply the funds they are saving in a variety of ways. They can put their funds in a bank, which will lend the funds for them. They can lend directly to corporations or the government by purchasing a *bond* (a contractual promise by the bond issuer to pay the funds back). Or they can purchase shares of corporate stock (shares of ownership in a corporation). In each of these cases, households supply funds to the market (rather than just stuffing cash into their mattress) because they receive a payment for doing so. We'll assume all the funds that households save are supplied to the loanable funds market, where they are loaned out. The payment households receive is called *interest*.

The total supply of loanable funds is equal to household saving. The funds supplied are loaned out, and households receive interest payments on these funds.

The Supply of Funds Curve

Interest is the reward for saving and supplying funds to the loanable funds market. So a rise in the interest rate will *increase* the quantity of funds supplied (household saving), while a drop in the interest rate decreases it.[3] This relationship is illustrated by Classica's upward-sloping **supply of funds curve** in Figure 6. If the interest rate is 3 percent, households save $1.5 trillion, and if the interest rate rises to 5 percent, people save more and the quantity of funds supplied rises to $1.75 trillion.

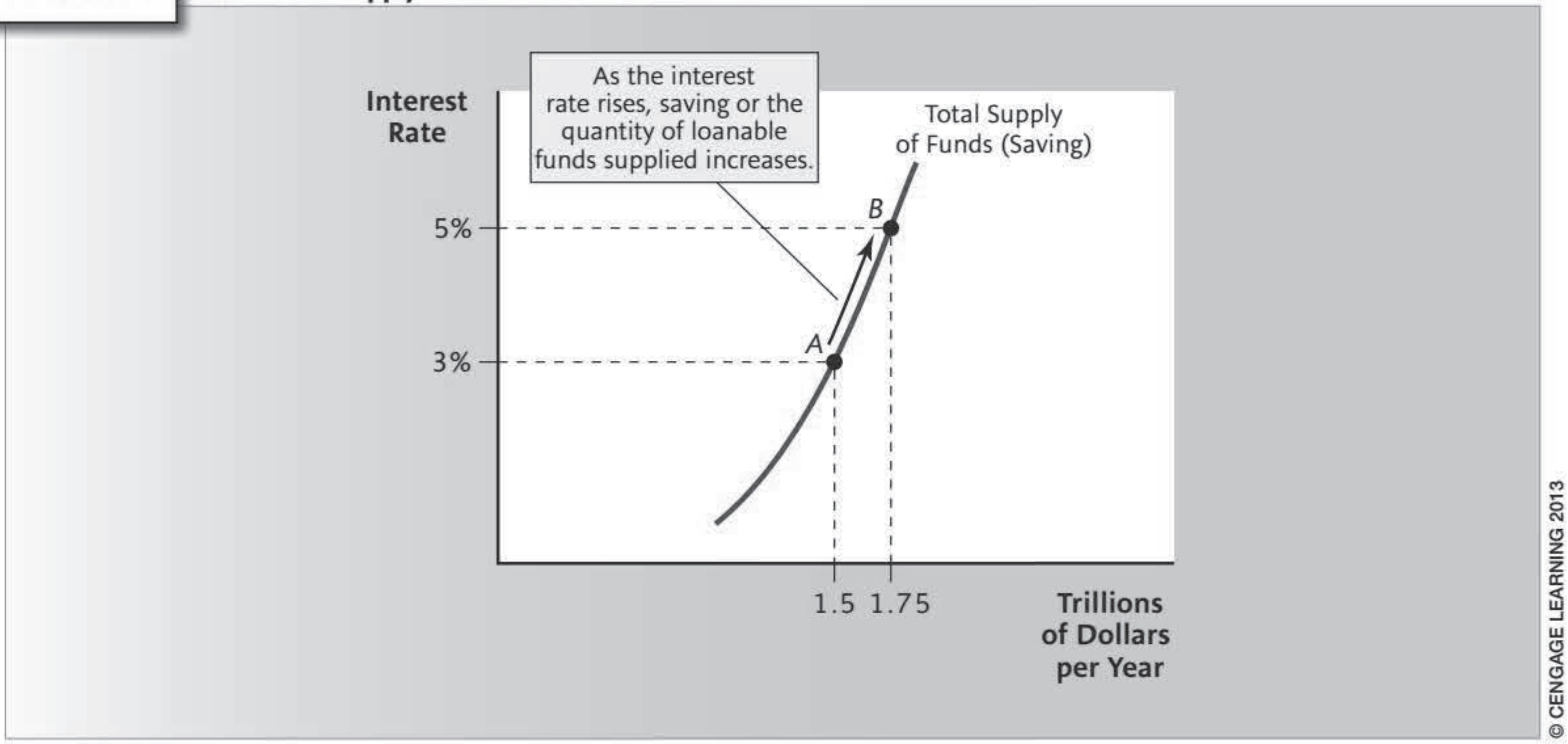
Supply of funds curve Indicates the level of household saving at various interest rates.

The quantity of funds supplied to the financial market depends positively on the interest rate. This is why the saving or supply of funds curve slopes upward.

Of course, other things can affect saving besides the interest rate: tax rates, expectations about the future, and the general willingness of households to postpone consumption, to name a few. In drawing the supply of funds curve, we assume each of these variables is constant. In the next chapter, we'll explore what happens when some of these variables change.

[3] In this chapter, we'll assume there is no inflation or expected inflation, so there is no need to distinguish between the real interest rate and the nominal interest rate. But if we wanted to bring inflation into our model, then saving would depend on the *real* interest rate that households expected to earn for supplying loanable funds. Similarly, business borrowing for investment (to be discussed next) would depend on the *real* interest rate that businesses expected to pay for borrowing.

FIGURE 6 **Household Supply of Loanable Funds**



The Demand for Loanable Funds

On the demand side of the market are the business firms and government agencies who borrow. In our classical model, when Avis wants to add cars to its automobile rental fleet, when McDonald's wants to build a new beef-processing plant, or when the local dry cleaner wants to buy new dry-cleaning machines, it will raise the funds it needs in the loanable funds market. So each firm's planned investment spending is equal to its demand for funds in the loanable funds market. Combining all firms together:

> *Businesses' total demand for loanable funds is equal to their total planned investment spending. The funds obtained are borrowed, and firms pay interest on these funds.*

Budget deficit The excess of government purchases over net taxes.

The other major borrower in the loanable funds market is the government sector. When government purchases of goods and services (G) are greater than net taxes (T), the government runs a **budget deficit** equal to $G - T$. Because the government cannot spend funds that it does not have, it must cover its deficit by borrowing in the loanable funds market. Thus, in any year, the government's demand for funds is equal to its deficit.

In our example in Table 1, Classica's government is running a budget deficit: Government purchases are \$2 trillion, while net taxes are \$1.25 trillion, giving us a deficit of \$2 trillion − \$1.25 trillion = \$0.75 trillion.

> *The government's demand for loanable funds is equal to its budget deficit. The funds are borrowed, and the government pays interest on its loans.*

Budget surplus The excess of net taxes over government purchases.

It is also possible for government purchases of goods and services (G) to be *less* than net taxes (T). In that case, the government runs a **budget surplus** equal to $T - G$. You'll be asked to to explore the classical model with a budget surplus in an end-of-chapter problem.

The Demand for Funds Curve

Businesses buy plant and equipment when the expected benefits exceed the costs. Since businesses obtain the funds for their investment spending from the loanable funds market, a key cost of any investment project is the interest rate that must be paid on borrowed funds. As the interest rate falls and investment costs decrease, more projects will look attractive, and planned investment spending will rise. This is the logic of the downward-sloping **business demand for funds curve** in Figure 7. At a 5 percent interest rate, firms would borrow $1 trillion and spend it on capital equipment; at an interest rate of 3 percent, business borrowing and investment spending would rise to $1.5 trillion.

Business demand for funds curve Indicates the level of investment spending firms plan at various interest rates.

When the interest rate falls, investment spending and the business borrowing needed to finance it rise.

What about the government's demand for funds? Will it, too, be influenced by the interest rate? Probably not very much. Government seems to be cushioned from the cost–benefit considerations that haunt business decisions. For this reason, when government is running a budget deficit, our classical model treats government borrowing as independent of the interest rate: No matter what the interest rate, the government sector's deficit—and its borrowing—is the same. This is why we have graphed the **government's demand for funds curve** as a vertical line in panel (b) of Figure 8.

Government demand for funds curve Indicates the amount of government borrowing at various interest rates.

The government sector's deficit and, therefore, its demand for funds are independent of the interest rate.

In Figure 8, the government deficit—and hence the government's demand for funds—is equal to $0.75 trillion at any interest rate.

Figure 8 also shows that the **total demand for funds curve** is found by horizontally summing the business demand curve [panel (a)] and the government demand curve

Total demand for funds curve Indicates the total amount of borrowing at various interest rates.

FIGURE 7 **Business Demand for Loanable Funds**

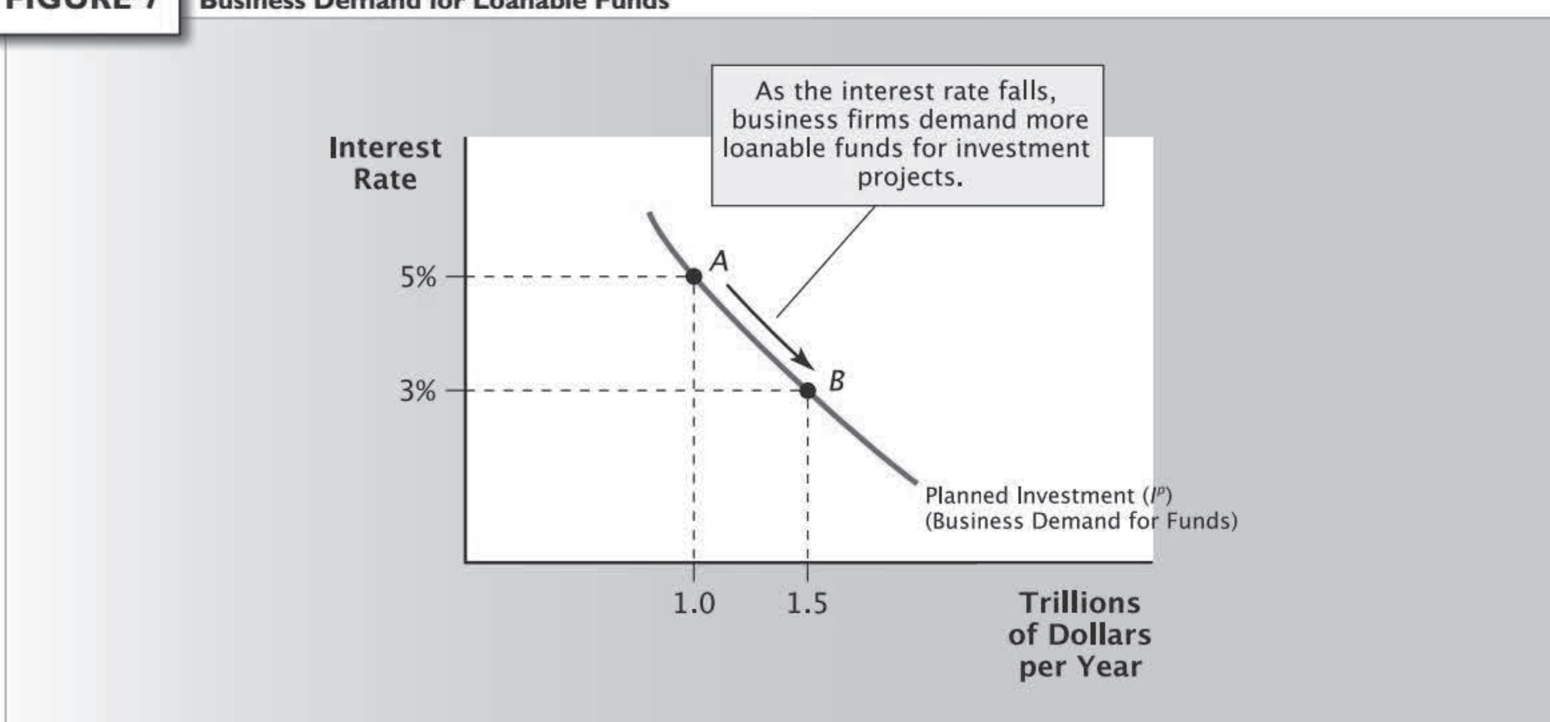
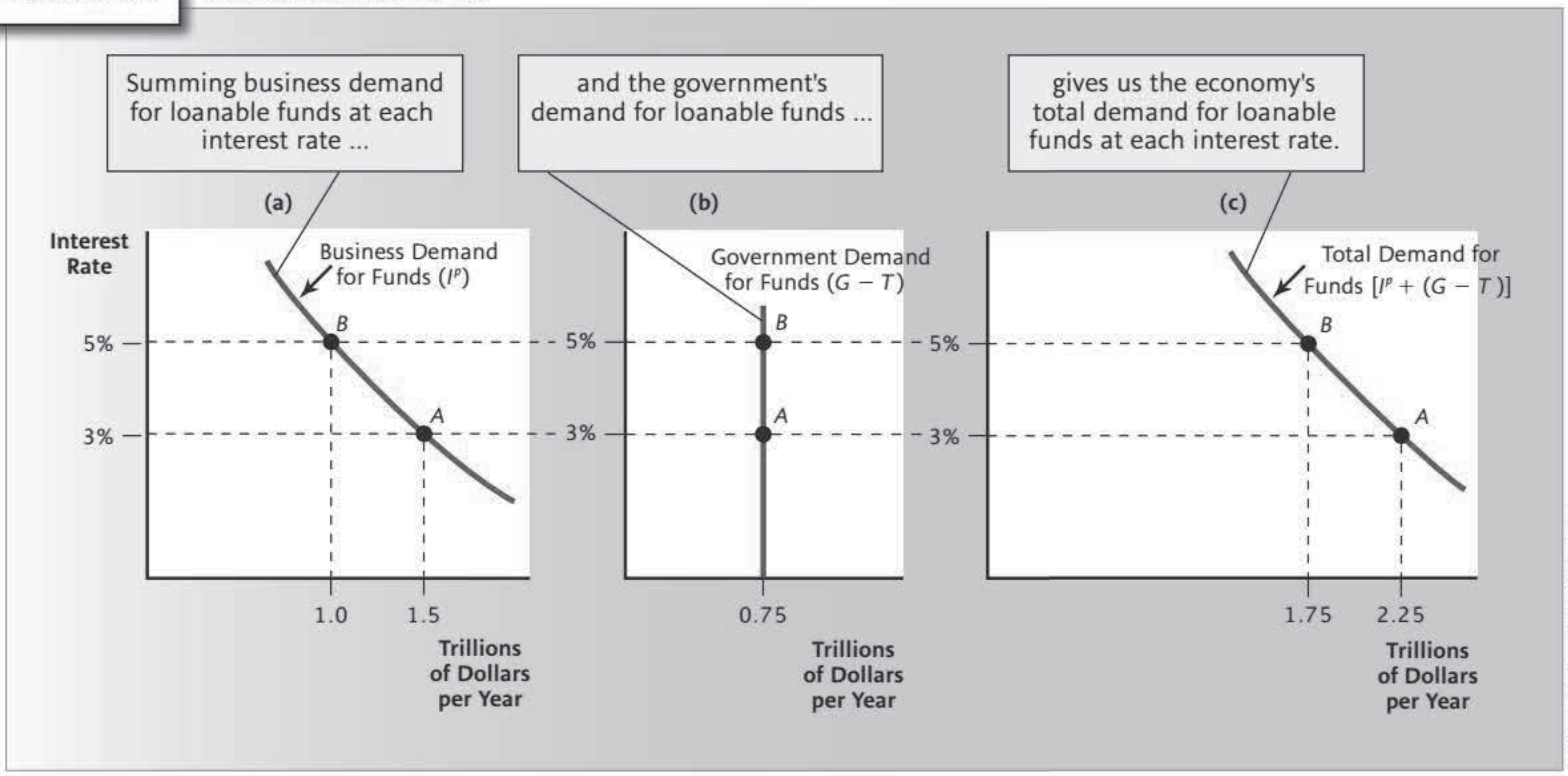


FIGURE 8 **The Demand for Funds**



[panel (b)]. For example, if the interest rate is 5 percent, firms demand $1 trillion in funds and the government demands $0.75 trillion, so that the total quantity of loanable funds demanded is $1.75 trillion. A drop in the interest rate—to 3 percent—increases business borrowing to $1.5 trillion while the government's borrowing remains at $0.75 trillion, so the total quantity of funds demanded rises to $2.25 trillion.

As the interest rate decreases, the quantity of funds demanded by business firms increases, while the quantity demanded by the government remains unchanged. Therefore, the total quantity of funds demanded rises.

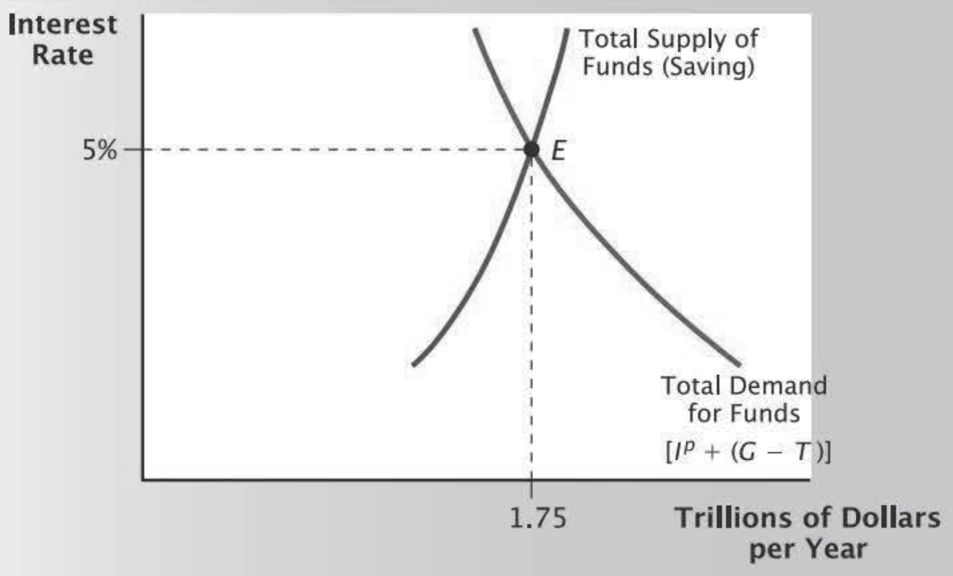
Equilibrium in the Loanable Funds Market

In the classical view, the loanable funds market—like all other markets—is assumed to clear: The interest rate will rise or fall until the quantities of funds supplied and demanded are equal. Figure 9 illustrates the loanable funds market of Classica, our fictional economy. Equilibrium occurs at point *E*, with an interest rate of 5 percent and total saving equal to $1.75 trillion. (To convince yourself that 5 percent is the equilibrium interest rate, mark an interest rate of 4 percent on the graph. Would there be an excess demand or an excess supply of loanable funds at this rate? How would the interest rate change? Then do the same for an interest rate of 6 percent.)

Once we know the equilibrium interest rate (5 percent), we can use the first two panels of Figure 8 to tell us exactly where the total household saving of $1.75 billion ends up. Panel (a) tells us that at 5 percent interest, business firms are borrowing $1 trillion of the total, and panel (b) tells us that the government is borrowing the remaining $0.75 trillion to cover its deficit.

So far, our exploration of the loanable funds market has shown us how three important variables in the economy are determined: the interest rate, the level of saving, and the level of investment. But it really tells us more. Remember the question that sent us on this detour into the loanable funds market in the first place: Can we be

FIGURE 9 **Loanable Funds Market Equilibrium**



Suppliers and demanders of funds interact to determine the interest rate in the loanable funds market. At an interest rate of 5%, quantity supplied and quantity demanded are both equal to $1.75 trillion.

sure that all of the output produced at full employment will be purchased? We now have the tools to answer this question.

The Loanable Funds Market and Say's Law

In Figure 5 of this chapter, you saw that total spending will equal total output if and only if *total leakages* in the economy (saving plus net taxes) are equal to *total injections* (planned investment plus government purchases). Now we can see why this requirement will be satisfied automatically in the classical model. Look at Figure 10, which duplicates the rectangles from Figure 5. But there is something added: arrows to indicate the flows between leakages and injections.

Let's follow the arrows to see what happens to all the leakages out of spending. One arrow shows that the entire leakage of net taxes ($1.25 trillion) flows to the government, which spends it. Now look at the other two arrows that show us what happens to the $1.75 trillion leakage of household saving. $0.75 trillion of this saving is borrowed by the government, while the rest—$1 trillion—is borrowed by business firms. Figure 10 shows us that net taxes and savings don't just disappear from the economy. Net taxes go to the government, which *spends them*. And any funds saved go either to the government—which spends them—or to business firms—which spend them.

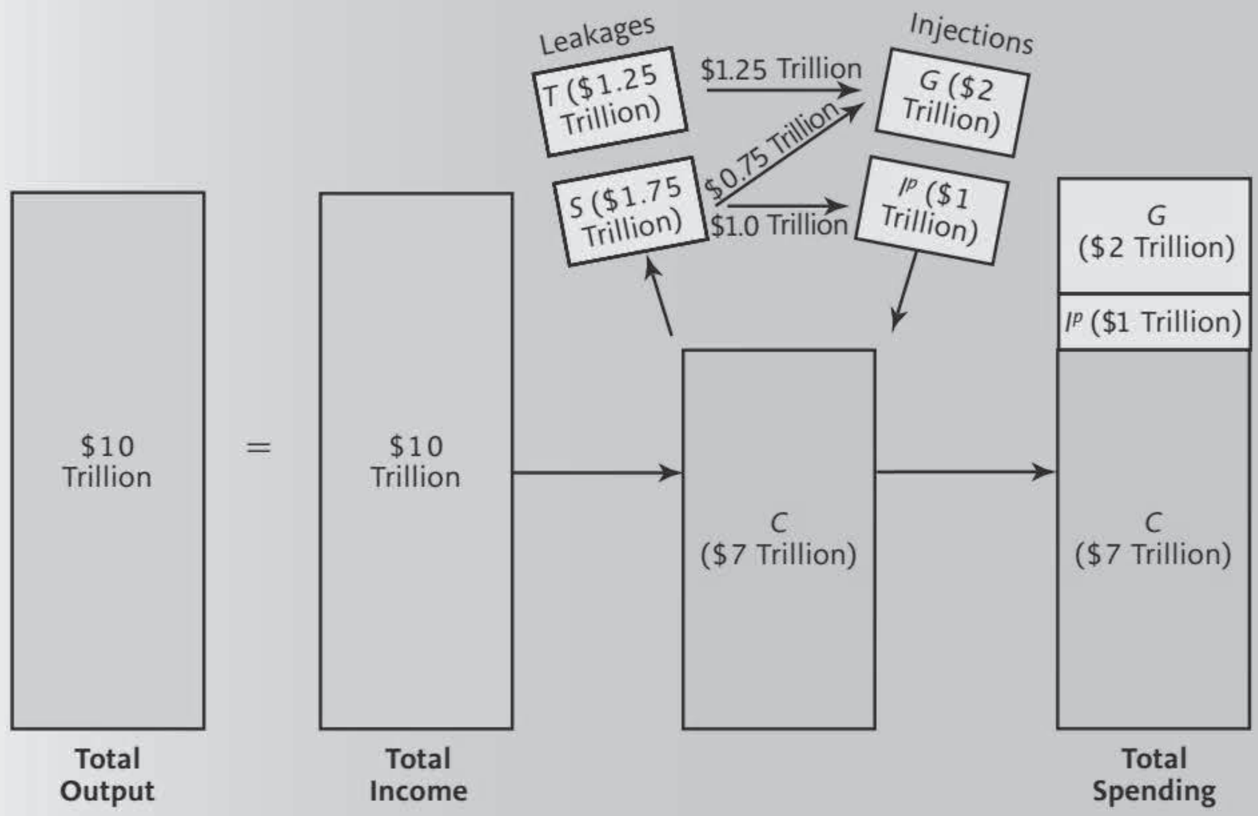
But wait . . . how do we know that *all* funds that are saved will end up going to either the government or businesses? Because the loanable funds market clears: The interest rate adjusts until the quantity of loanable funds supplied (saving) is equal to the quantity of loanable funds demanded (government and business borrowing).

We can put all this together as follows: Every dollar of output creates a dollar of household income, by definition. And—as long as the loanable funds market clears—every dollar of income will either be spent by households themselves or passed along to some *other* sector of the economy that will spend it in their place.

Or, to put it even more simply,

as long as the loanable funds market clears, Say's law holds: Total spending equals total output. This is true even in a more realistic economy with saving, taxes, investment, and a government deficit.

FIGURE 10 **How the Loanable Funds Market Ensures That Total Spending = Total Output**



Because the loanable funds market clears, we know that total leakages will automatically equal total injections. The leakage of net taxes goes to the government and is spent on government purchases. If the government is running a budget deficit, it will also borrow part of the leakage of household saving and spend that too. Any household saving left over will be borrowed by business firms and spent on capital. Thus, every dollar of leakages turns into spending by either government or private business firms.

Say's Law with Equations

Here's another way to see the logic behind Say's law, with some simple equations. Because the loanable funds market clears, we know that the interest rate—the price in this market—will rise or fall until the quantity of funds supplied (savings, S) is equal to the quantity of funds demanded (planned investment plus the deficit, or $I^p + (G - T)$):

$$\text{Loanable funds market clears} \implies \underbrace{S}_{\substack{\text{Quantity of}\\ \text{funds supplied}}} = \underbrace{I^p + (G - T)}_{\substack{\text{Quantity of}\\ \text{funds demanded}}}$$

Rearranging this equation by moving T to the left side, we have:

$$\text{Loanable funds market clears} \implies \underbrace{S + T}_{\text{Leakages}} = \underbrace{I^p + G}_{\text{Injections}}$$

So now, we know that as long as the loanable funds market clears, leakages equal injections. Finally, remember that

$$\text{Leakages} = \text{Injections} \implies \text{Total spending} = \text{Total output}$$

In other words, market clearing in the loanable funds market *assures us* that total leakages in the economy will equal total injections, which in turn *assures us* that total spending will be just sufficient to purchase total output.

Say's Law in Perspective

Say's law is a powerful concept. But be careful not to overinterpret it. Say's law shows that the *total* value of spending in the economy will equal the *total* value of output, which rules out a *general* overproduction or underproduction of goods in the economy. It does not promise us that each firm in the economy will be able to sell all of the particular good it produces. It is perfectly consistent with Say's law that there be excess supplies in some markets, as long as they are balanced by excess demands in other markets.

But lest you begin to think that the classical economy might be a chaotic mess, with excess supplies and demands in lots of markets for different goods, don't forget about the *market-clearing* assumption. In each market for each good, the price adjusts until the quantities supplied and demanded are equal. For this reason, the classical, long-run view rules out over- or underproduction in individual markets, as well as the generalized overproduction ruled out by Say's law.

Fiscal Policy in the Classical Model

When the government changes either net taxes or its own purchases in order to influence total output, it is engaging in **fiscal policy.** There are two different effects that fiscal policy, in theory, could have on total output.

Fiscal policy A change in government purchases or net taxes designed to change total output.

The *supply-side* effects of fiscal policy on output come from changing the quantities of resources available in the economy. We'll discuss these supply-side effects in the next chapter. Here, we'll discuss only the potential **demand-side effects** of fiscal policy, which are entirely different. These effects arise from fiscal policy's impact on total *spending*.

Demand-side effects Macroeconomic policy effects on total output that work through changes in total spending.

At first glance, using fiscal policy to change total spending and thereby change the economy's real GDP seems workable. For example, if the government cuts taxes or increases transfer payments, households would have more income, so their consumption spending would increase. Or the government itself could purchase more goods and services. In either case, if total spending rises, and business firms *sell* more output, they should want to hire more workers and *produce* more output as well. The economy's real GDP would rise, and so would total employment.

It sounds reasonable. Does it work?

Not if the economy behaves according to the classical model. As you are about to see, in the classical model *fiscal policy has no demand-side effects at all.*

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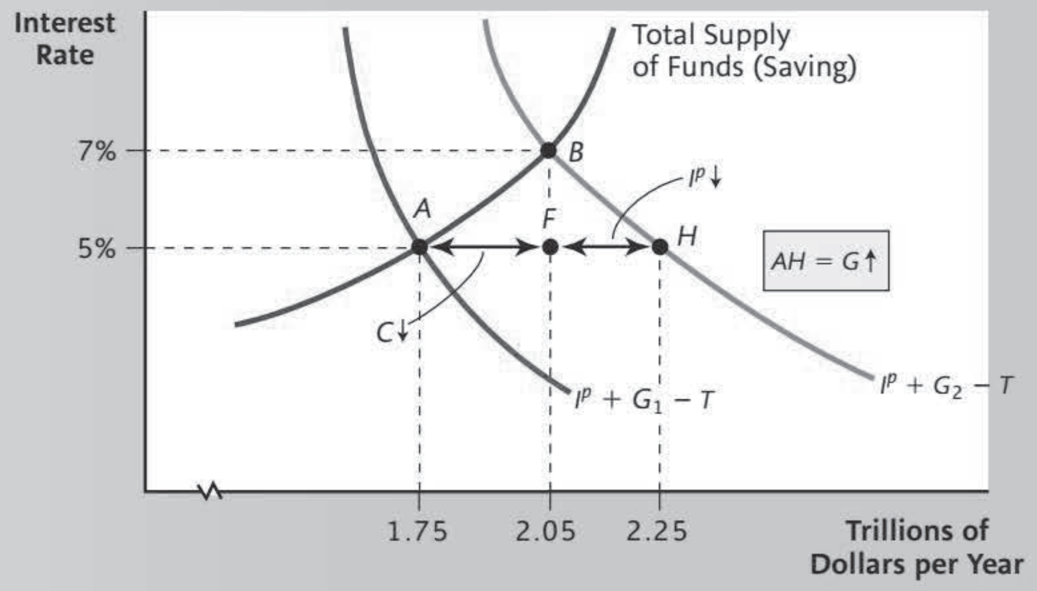
An Increase in Government Purchases

Let's first see what would happen if the government of Classica attempted to increase output and employment by increasing government purchases. More specifically, suppose the government raised its spending by $0.5 trillion, hiring people to fix roads and bridges, or hiring more teachers, or increasing its spending on goods and services for homeland security. What would happen?

To answer this, we must first answer another question: Where will Classica's government get the additional $0.5 trillion it spends? If the government raises taxes, it will lower households' disposable income,

FIGURE 11 **Crowding Out from an Increase in Government Purchases**

Beginning from equilibrium at point A, an increase in the budget deficit caused by additional government purchases shifts the demand for funds curve from $I^p + G_1 - T$ to $I^p + G_2 - T$. At point H, the quantity of funds demanded exceeds the quantity supplied, so the interest rate begins to rise. As it rises, households are led to save more, and business firms invest less. In the new equilibrium at point B, both consumption and investment spending have been completely crowded out by the increased government spending.



and their consumption spending would decrease. In terms of spending, the government would be taking away with one hand what it is giving with the other. So let's assume the government does *not* raise taxes. In that case, with more government spending, the government's budget deficit ($G - T$) will rise, so the government must dip into the loanable funds market to *borrow* the additional funds.

Figure 11 illustrates the effects. Initially, with government purchases equal to \$2 trillion, the demand for funds curve is $I^p + G_1 - T$, where G_1 represents the initial level of government purchases. The equilibrium occurs at point *A* with the interest rate equal to 5 percent.

If government purchases increase by \$0.5 trillion, with no change in taxes, the budget deficit increases by \$0.5 trillion and so does the government's demand for funds. The demand for funds curve shifts rightward by \$0.5 trillion to $I^p + G_2 - T$, where G_2 represents an amount \$0.5 trillion greater than G_1. After the shift, there would be an excess demand for funds at the original interest rate of 5 percent. The total quantity of funds demanded would be \$2.25 trillion (point *H*), while the quantity supplied would continue to be \$1.75 trillion (point *A*). Thus, the excess demand for funds would be equal to the distance *AH* in the figure, or \$0.5 trillion. This excess demand drives up the interest rate to 7 percent. As the interest rate rises, two things happen.

First, a higher interest rate chokes off some investment spending, as business firms decide that certain investment projects no longer make sense. For example, the local dry cleaner might wish to borrow funds for a new machine at an interest rate of 5 percent, but not at 7 percent. In the figure, we move along the new demand for funds curve from point *H* to point *B*. Planned investment drops by \$0.2 trillion (because the total demand for funds falls from \$2.25 trillion to \$2.05 trillion). (Question: How do we know that only business borrowing, and not also government borrowing, adjusts as we move from point *H* to point *B*?) Thus, one consequence of the rise in government purchases is a *decrease in planned investment spending.*

But that's not all: The rise in the interest rate also causes saving to increase. Of course, when people save more of their incomes, they spend less, so another consequence of the rise in government purchases is a *decrease in consumption spending*. In the figure, we move from point *A* to point *B* along the saving curve. As saving increases from \$1.75 trillion to \$2.05 trillion—a rise of \$0.3 trillion—consumption falls by \$0.3 trillion.

DANGEROUS CURVES

G and T are separate variables It is common to think that a rise in government purchases (*G*) implies an equal rise in net taxes (*T*) to pay for it. But as you've seen in our discussion, economists treat *G* and *T* as two separate variables. Unless stated otherwise, we use the *ceteris paribus* assumption: When we change *G*, we assume *T* remains constant, and when we change *T*, we assume *G* remains constant. It is the budget deficit (or surplus) that changes when *T* or *G* changes.

Crowding Out and Complete Crowding Out

As you've just seen, the increase in government purchases causes both planned investment spending and consumption spending to decline. We say that the government's purchases have *crowded out* the spending of households (C) and businesses (I^p).

> ***Crowding out** is a decline in one sector's spending caused by an increase in some other sector's spending.*

Crowding out A decline in one sector's spending caused by an increase in some other sector's spending.

But we are not quite finished. If we sum the drop in C and the drop in I^p, we find that total private sector spending has fallen by \$0.3 trillion + \$0.2 trillion = \$0.5 trillion. That is, the drop in private sector spending is *precisely equal* to the rise in government purchases, G. Not only is there crowding out, there is **complete crowding out:** Each dollar of government purchases causes private sector spending to decline by a full dollar. The net effect is that total spending ($C + I^p + G$) does not change at all!

Complete crowding out A dollar-for-dollar decline in one sector's spending caused by an increase in some other sector's spending.

> *In the classical model, a rise in government purchases completely crowds out private sector spending, so total spending remains unchanged.*

The Logic of Complete Crowding Out

A closer look at Figure 11 shows why, in the classical model, an increase in government purchases will always cause complete crowding out, regardless of the particular numbers used or the shapes of the curves. When G increases, the demand for funds curve shifts rightward by the same amount that G rises, or the distance from point A to point H. Then the interest rate rises, moving us along the supply of funds curve from point A to point B. As a result, saving rises (and consumption falls) by the distance AF. But the rise in the interest rate *also* causes a movement along the demand for funds curve, from point H to point B. As a result, investment spending falls by the amount FH.

The final impact can be summarized as follows:

- $G\uparrow = AH$
- $C\downarrow = AF$
- $I^p\downarrow = FH$

And since $AF + FH = AH$, we know that the combined decrease in C and I^p is precisely equal to the increase in G.

Because there is complete crowding out in the classical model, a rise in government purchases cannot change total spending. If we step back from the graph and think about it, this result makes perfect sense. Each additional dollar the government spends is obtained from the loanable funds market, where *it would have been spent by someone else* if the government hadn't borrowed it. How do we know this? Because the loanable funds market funnels every dollar of household saving—no more and no less—to either the government or business firms. If the government borrows more, it just removes funds that would have been spent by businesses (the drop in I^p) or by consumers (the drop in C).

Remember that the goal of this increase in government purchases was to increase output and employment *by increasing total spending*. But now we see that the policy fails to increase spending at all. Therefore,

in the classical model, an increase in government purchases has no demand-side effects on total output or total employment.

Of course, the opposite sequence of events would happen if government purchases *decreased*: The drop in G would *shrink* the deficit. The interest rate would decline, and private sector spending (C and I^p) would rise by the same amount that government purchases had fallen. (See if you can draw the graphs to prove this to yourself.) Once again, total spending and total output would remain unchanged.

A Decrease in Net Taxes

Suppose that the government, instead of increasing its own purchases by \$0.5 trillion, tried to increase total spending through a \$0.5 trillion cut in net taxes. For example, the government of Classica could decrease income tax collections by \$0.5 trillion, or increase transfer payments such as unemployment benefits by that amount. What would happen?

In general, households respond to a cut in net taxes by spending some of it and saving the rest. But let's give this policy every chance of working by making an extreme assumption in its favor: We'll assume that households *spend the entire \$0.5 trillion tax cut* on consumption goods; they save none of it.

Figure 12 shows what will happen in the market for loanable funds. Initially, the demand for funds curve is $I^p + G - T_1$, where T_1 is the initial level of net taxes. The equilibrium is at point A, with an interest rate of 5 percent. If we cut net taxes (T) by \$0.5 trillion, while holding government purchases constant, the budget deficit increases by \$0.5 trillion, and so does the government's demand for funds. The demand for funds curve shifts rightward to $I^p + G - T_2$, where T_2 is an amount \$0.5 trillion less than T_1.

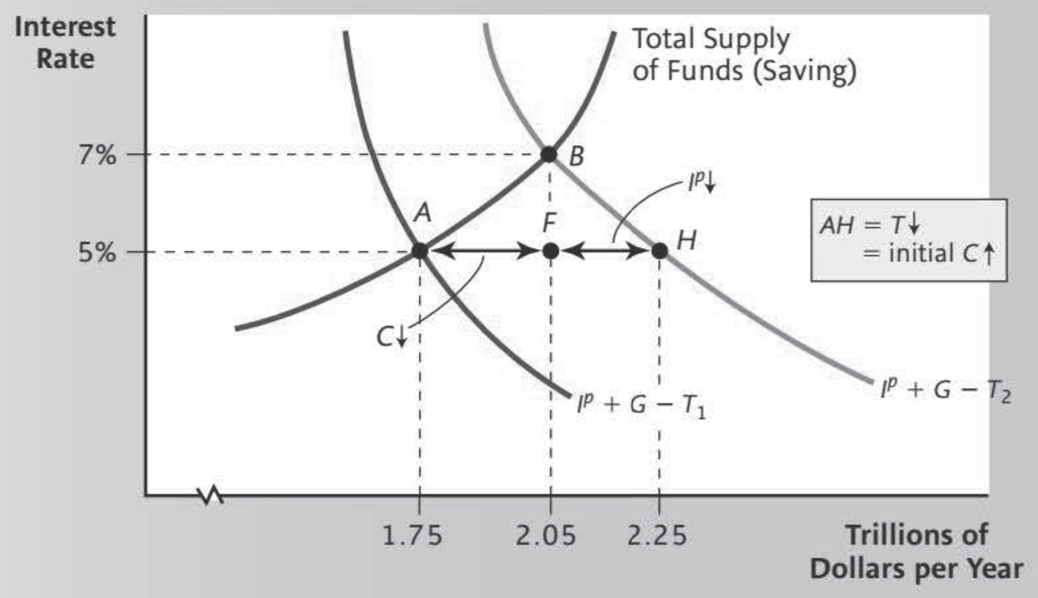
The increase in the demand for funds drives the interest rate up to 7 percent, until we reach a new equilibrium at point B. As the interest rate rises, two things happen.

First, a higher interest rate will encourage more saving, which means a decrease in consumption spending. This is a movement along the supply of funds curve, from point A to point B, with saving rising (and consumption falling) by \$0.3 trillion.

Second, a higher interest rate will decrease investment spending. This is shown by the movement from H to B along the new demand for funds curve. Planned investment decreases by \$0.2 trillion.

What has happened to *total* spending? Only two components of spending have changed in this case: C and I^p. Let's first consider what's happened to consumption (C). First, we had a \$0.5 trillion *rise* in consumption from the tax cut (remember: we assumed the entire tax cut was spent). This is equal to the horizontal distance AH. Then, because the interest rate rose, we had a \$0.3 billion *decrease* in consumption. This decrease is equal to the horizontal distance AF. Taking both effects together,

FIGURE 12 **Crowding Out from a Tax Cut**



Beginning from equilibrium at point A*, an increase in the budget deficit caused by a tax cut shifts the demand for funds curve from* $I^P + G - T_1$ *to* $I^P + G - T_2$*. If the tax cut is entirely spent, consumption initially rises by the distance* AH.

At the original interest rate of 5 percent, the quantity of funds demanded now exceeds the quantity supplied. This causes the interest rate to rise.

As the interest rate rises, we move from A *to* B *along the supply of funds curve. Saving rises (and consumption falls) by the distance* AF. *The final rise in consumption is* FH. *We also move along the demand for funds curve from* H *to* B, *so investment falls by the distance* FH. *In the new equilibrium at point* B, *consumption (which has risen by* FH*) has completely crowded out investment (which has dropped by* FH*).*

the net effect is a rise of \$0.5 trillion − \$0.3 trillion = \$0.2 trillion. This net rise in consumption is shown by the distance *FH*.

Now remember what has happened to planned investment spending: It fell by \$0.2 billion (the distance *FH*)—the same amount that consumption spending rose. In other words, the tax cut increases consumption but decreases planned investment by the same amount. We can say that greater consumption spending *completely crowds out* planned investment spending, leaving total spending unchanged.

In the classical model, a cut in net taxes raises consumption, which completely crowds out planned investment. Total spending remains unchanged, so the tax cut has no demand-side effects on total output or employment.

[redacted]