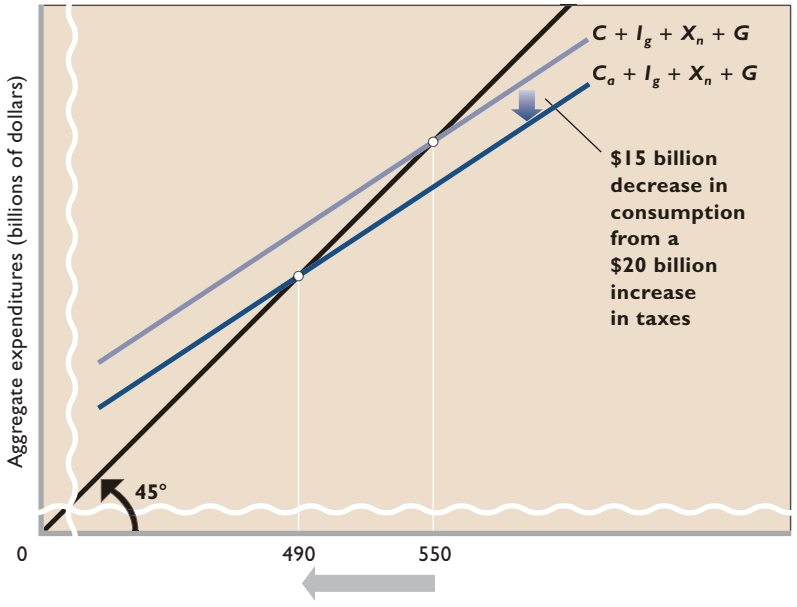


FIGURE 28.6 Taxes and equilibrium GDP. If the MPC is .75, the $20 billion of taxes will lower the consumption schedule by $15 billion and cause a $60 billion decline in the equilibrium GDP. In the open economy with government, equilibrium GDP occurs where C_a (after-tax income) + I_g + X_n + G = GDP. Here that equilibrium is $490 billion.

4, we find the tax increase of $20 billion reduced GDP by $60 billion (not $80 billion).

Table 28.5 and Figure 28.6 constitute the complete aggregate expenditures model for an open economy with government. When total spending equals total production, the economy's output is in equilibrium. In the open mixed economy, equilibrium GDP occurs where

$$C_a + I_g + X_n + G = \text{GDP}.$$

Injections, Leakages, and Unplanned Changes in Inventories The related characteristics of equilibrium noted for the private closed economy also apply to the full model. In particular, it is still the case that injections into the income-expenditures stream equal leakages from the income stream. For the private closed economy, $S = I_g$. For the expanded economy, imports and taxes are added leakages. Saving, importing, and paying taxes are all uses of income that subtract from potential consumption. Consumption will now be less than GDP—creating a potential spending gap—in the amount of after-tax saving (S_a), imports (M), and taxes (T). But exports (X) and government purchases (G), along with investment (I_g), are injections into the income-expenditures stream. At the equilibrium GDP, the sum of the leakages equals the sum of injections. In symbols:

$$S_a + M + T = I_g + X + G$$

You should use the data in Table 28.5 to confirm this equality between leakages and injections at the equilibrium GDP of $490 billion. Also, substantiate that a lack of such equality exists at all other possible levels of GDP.

Although not directly shown in Table 28.5, the equilibrium characteristic of "no unplanned changes in inventories" will also be fulfilled at the $490 billion GDP. Because aggregate expenditures equal GDP, all the goods and services produced will be purchased. There will be no unplanned increase in inventories, so firms will have no incentive to reduce their employment and production. Nor will they experience an unplanned decline in their inventories, which would prompt them to expand their employment and output in order to replenish their inventories.

INTERACTIVE GRAPHS
G 28.2
Changes in GDP

Equilibrium versus Full-Employment GDP

A key point about the equilibrium GDP of the aggregate expenditures model is that it need not equal the economy's full-employment GDP. In fact, Keynes specifically designed the model so that it could explain situations like the Great Depression, during which the economy was seem-

ingly stuck at a bad equilibrium in which real GDP was far below potential output. As we will show you in a moment, Keynes also used the model to suggest policy recommendations for moving the economy back toward potential output and full employment.

The fact that equilibrium and potential GDP in the aggregate expenditure model need not match also reveals critical insights about the causes of demand-pull inflation. We will first examine the "expenditure gaps" that give rise to differences between equilibrium and potential GDP and then see how the model helps to explain the recession of 2001 and the recent period in which the United States achieved potential output even while experiencing massive net export deficits.

Recessionary Expenditure Gap

Suppose in **Figure 28.7 (Key Graph),** panel (a), that the full-employment level of GDP is $510 billion and the aggregate expenditures schedule is AE_1. (For simplicity, we will now dispense with the $C_a + I_g + X_n + G$ labeling.) This schedule intersects the 45° line to the left of the economy's full-employment output, so the economy's equilibrium GDP of $490 billion is $20 billion short of its full-employment output of $510 billion. According to column 1 in Table 28.2, total employment at the full-employment GDP is 75 million workers. But the economy depicted in Figure 28.7a is employing only 70 million workers; 5 million available workers are not employed. For that reason, the economy is sacrificing $20 billion of output.

A **recessionary expenditure gap** is the amount by which aggregate expenditures *at the full-employment GDP* fall short of those required to achieve the full-employment GDP. Insufficient total spending contracts or depresses the economy. Table 28.5 shows that at the full-employment level of $510 billion (column 1), the corresponding level of aggregate expenditures is only $505 billion (column 9). The recessionary expenditure gap is thus $5 billion, the amount by which the aggregate expenditures curve would have to shift upward to realize equilibrium at the full-employment GDP. Graphically, the recessionary expenditure gap is the *vertical* distance (measured at the full-employment GDP) by which the actual aggregate expenditures schedule AE_1 lies below the hypothetical full-employment aggregate expenditures schedule AE_0. In Figure 28.7a, this recessionary expenditure gap is $5 billion. Because the multiplier is 4, there is a $20 billion differential (the recessionary expenditure gap of $5 billion times the multiplier of 4) between the equilibrium GDP and the full-employment GDP. This $20 billion difference is a negative *GDP gap*—an idea we first developed when discussing cyclical unemployment in Chapter 26.

Keynes' Solution to a Recessionary Expenditure Gap

Keynes pointed to two different policies that a government might pursue to close a recessionary expenditure gap and achieve full employment. The first is to increase government spending. The second is to lower taxes. Both work by increasing aggregate expenditures.

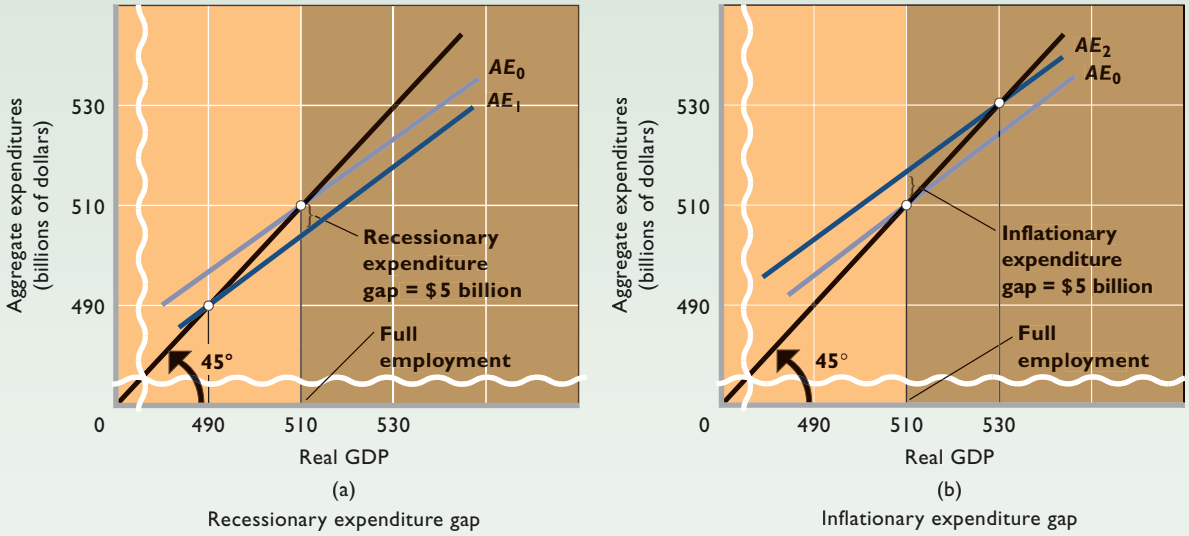
Look back at Figure 28.5. There we showed how an increase in government expenditures G will increase overall aggregate expenditures and, consequently, the equilibrium real GDP. Applying this strategy to the situation in Figure 28.7a, government could completely close the $20 billion negative GDP gap between the initial equilibrium of $490 billion and the economy's potential output of $510 billion if it increased spending by the $5 billion amount of the recessionary expenditure gap. Given the economy's multiplier of 4, the $5 billion increase in G would create a $20 billion increase in equilibrium real GDP, thereby bringing the economy to full employment.

Government also could lower taxes to close the recessionary expenditure gap and thus eliminate the negative GDP gap. Look back at Figure 28.6 in which an increase in taxes resulted in lower after-tax consumption spending and a smaller equilibrium real GDP. Keynes simply suggested a reversal of this process: Since an increase in taxes lowers equilibrium real GDP, a decrease in taxes will raise equilibrium GDP. The decrease in taxes will leave consumers with higher after-tax income. That will lead to higher consumption expenditures and an increase in equilibrium real GDP.

But by how much should the government cut taxes? By exactly $6.67 billion. That is because the MPC is .75. The tax cut of $6.67 billion will increase consumers' after-tax income by $6.67 billion. They will then increase consumption spending by .75 of that amount, or $5 billion. This will increase aggregate expenditures by the $5 billion needed to close the recessionary expenditure gap. The economy's equilibrium real GDP will rise to its potential output of $510 billion.

But a big warning is needed here: As the economy moves closer to its potential output, it becomes harder to justify Keynes' assumption that prices are stuck. As the economy closes its negative GDP gap, nearly all workers are employed and nearly all factories are operating at or near full capacity. In such a situation, there is no massive oversupply of productive resources to keep prices from rising. In fact, economists know from real-world experience that in such situations prices are not fully stuck. Instead, they become increasingly flexible as the economy moves nearer to potential output.

FIGURE 28.7 Recessionary and inflationary expenditure gaps. The equilibrium and full-employment GDPs may not coincide. (a) A recessionary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP fall short of those needed to achieve the full-employment GDP. Here, the $5 billion recessionary expenditure gap causes a $20 billion negative GDP gap. (b) An inflationary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP exceed those just sufficient to achieve the full-employment GDP. Here, the inflationary expenditure gap is $5 billion; this overspending produces demand-pull inflation.



QUICK QUIZ FOR FIGURE 28.7

1. In the economy depicted:
   a. the MPS is .50.
   b. the MPC is .75.
   c. the full-employment level of real GDP is $530 billion.
   d. nominal GDP always equals real GDP.
2. The inflationary expenditure gap depicted will cause:
   a. demand-pull inflation.
   b. cost-push inflation.
   c. cyclical unemployment.
   d. frictional unemployment.
3. The recessionary expenditure gap depicted will cause:
   a. demand-pull inflation.
   b. cost-push inflation.
   c. cyclical unemployment.
   d. frictional unemployment.
4. In the economy depicted, the $5 billion inflationary expenditure gap:
   a. expands real GDP to $530 billion.
   b. leaves real GDP at $510 billion but causes inflation.
   c. could be remedied by equal $5 billion increases in taxes and government spending.
   d. implies that real GDP exceeds nominal GDP.

Answers: 1. b; 2. a; 3. c; 4. b

This fact is one of the major limitations of the aggregate expenditures model and is the reason why we will develop a different model that can handle inflation in the next chapter. That being said, it is nevertheless true that the aggregate expenditures model is still very useful despite its inability to handle flexible prices. For instance, as we explained in Chapter 23, even an economy operating near full employment will show sticky or even stuck prices in the short run. In such situations, the intuitions of the aggregate expenditures model will still hold true. The benefit of the aggregate demand–aggregate supply model that we develop in the next chapter is that it also can show us what happens over longer periods, as prices (and wages) become more flexible and are increasingly able to adjust.

WORKED PROBLEMS

W 28.3

Expenditure gaps

Inflationary Expenditure Gap

Economists use the term **inflationary expenditure gap** to describe the amount by which an economy's aggregate expenditures *at the full-employment GDP* exceed those just

necessary to achieve the full-employment level of GDP. In Figure 28.7b, there is a $5 billion inflationary expenditure gap at the $510 billion full-employment GDP. This is shown by the vertical distance between the actual aggregate expenditures schedule AE_2 and the hypothetical schedule AE_0, which would be just sufficient to achieve the $510 billion full-employment GDP. Thus, the inflationary expenditure gap is the amount by which the aggregate expenditures schedule would have to shift downward to realize equilibrium at the full-employment GDP.

But why does the name "inflationary expenditure gap" contain the word *inflationary*? In particular, what does the situation depicted in Figure 28.7b have to do with inflation? The answer lies in the answer to a different question: *Could the economy actually achieve and maintain an equilibrium real GDP that is substantially above the full-employment output level?*

The unfortunate answer is no. It is unfortunate because if such a thing were possible, then the government could make real GDP as high as it wanted by simply increasing G to an arbitrarily high number. Graphically, it could raise the AE_2 curve in Figure 28.7b as far up as it wanted, thereby raising equilibrium real GDP up as high as it wanted. Living standards would skyrocket! But this is not possible because, by definition, all the workers in the economy are fully employed at the full-employment output level. Producing a bit more than the full-employment output level for a few months might be possible if you could convince all the workers to work overtime day after day. But there simply isn't enough labor to have the economy produce at much more than potential output for any extended period of time.

So what *does* happen in situations in which aggregate expenditures are so high that the model predicts an equilibrium level of GDP beyond potential output? The answer is twofold. First, the economy ends up producing either at potential output or just above potential output due to the limited supply of labor. Second, the economy experiences demand-pull inflation. With the supply of output limited by the supply of labor, high levels of aggregate expenditures simply act to drive up prices. Nominal GDP will increase because of the higher price level, but real GDP will not. **(Key Question 13)**

Application: The U.S. Recession of 2001

The U.S. economy grew briskly in the last half of the 1990s, with real GDP expanding at about 4 percent annually and the unemployment rate averaging roughly 4.5 percent. The economic boom and low rates of unemployment, however, did not spark inflation, as had been the case in prior business cycles. Exceptionally strong productivity growth in the late 1990s increased the economy's production capacity and enabled aggregate expenditures to expand without causing inflation. In terms of Figure 28.7b, it was as if the full-employment level of real GDP expanded from $510 billion to $530 billion at the same time the aggregate expenditures curve rose from AE_0 to AE_2. So the inflationary expenditure gap of $5 billion never materialized. Between 1995 and 1999, inflation averaged less than 2.5 percent annually.

But the booming economy of the second half of the 1990s produced notable excesses. A large number of ill-conceived Internet-related firms were born, attracting billions of investment dollars. Investment spending surged throughout the economy and eventually added too much production capacity. A stock market "bubble" developed as stock market investing became a national pastime. Consumers increased their household debt to expand their consumption. Some unscrupulous executives engaged in fraudulent business practices to further their own personal interests.

The boom ended in the early 2000s. Hundreds of Internet-related start-up firms folded. Many firms, particularly those in telecommunications and aircraft manufacturing, began to experience severe overcapacity. The stock market bubble burst, erasing billions of dollars of "paper" wealth. Firms significantly reduced their investment spending because of lower estimates of rates of return. In March 2001 aggregate expenditures declined sufficiently to push the economy into its ninth recession since 1950. The unemployment rate rose from 4.2 percent in February 2001 to 5.8 percent in December 2001. In terms of Figure 28.7a, a recessionary expenditure gap emerged. The terrorist attacks of September 11, 2001, damaged consumer confidence and prolonged the recession through 2001. In 2002 the economy resumed economic growth, but the unemployment rate remained a stubbornly high 6 percent at the end of 2002. Even so, the recession of 2001 was relatively mild by historical standards and in view of the unusual set of circumstances.

Application: Full-Employment Output, with Large Negative Net Exports

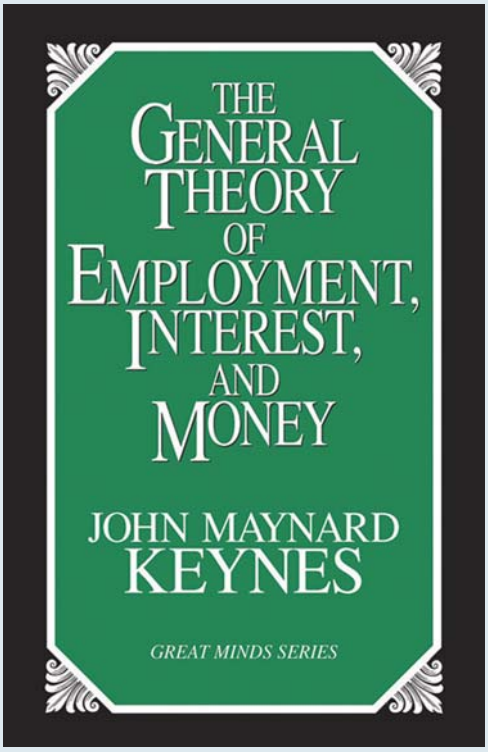
In 2007 the United States had negative net exports of $560 billion in real (2000) dollar terms, yet its actual (real) GDP of $11,567 billion roughly matched its potential (real) GDP of $11,687. The economy experienced neither a recessionary expenditure gap nor an inflationary expenditure

LAST Word

Say's Law, the Great Depression, and Keynes

The Aggregate Expenditure Theory Emerged as a Critique of Classical Economics and as a Response to the Great Depression.

Until the Great Depression of the 1930s, many prominent economists, including David Ricardo (1772–1823) and John Stuart Mill (1806–1873), believed that the market system would ensure full employment of an economy's resources. These so-called *classical economists* acknowledged that now and then abnormal circumstances such as wars, political upheavals, droughts, speculative crises, and gold rushes would occur, deflecting the economy from full-employment status. But when such deviations occurred, the economy would automatically adjust and soon return to full-employment output. For example, a slump in output and employment would result in lower prices, wages, and interest rates, which in turn would increase consumer spending, employment, and investment spending. Any excess supply of goods and workers would soon be eliminated.



Classical macroeconomists denied that the level of spending in an economy could be too low to bring about the purchase of the entire full-employment output. They based their denial of inadequate spending in part on *Say's law*, attributed to the nineteenth-century French economist J. B. Say (1767–1832). This law is the disarmingly simple idea that the very act of producing goods generates income equal to the value of the goods produced. The production of any output automatically provides the income needed to buy that output. More succinctly stated, *supply creates its own demand*.

Say's law can best be understood in terms of a barter economy. A woodworker, for example, produces or supplies furniture as a means of buying or demanding the food and clothing produced by other workers. The woodworker's supply of furniture is the income that he will "spend" to satisfy his demand for other goods. The goods he buys (demands) will have a total value exactly equal to the goods he produces (supplies). And so it is for other producers and for the entire economy. Demand must be the same as supply!

ORIGIN OF THE IDEA

O 28.2
Say's law

Assuming that the composition of output is in accord with consumer preferences, all markets would be cleared of their outputs. It would seem that all firms need to do to sell a full-employment output is to produce that level of output. Say's law guarantees there will be sufficient spending to purchase it all.

The Great Depression of the 1930s called into question the theory that supply creates its own demand (Say's law). In the United States, real GDP declined by 27 percent and the unemployment rate rocketed to nearly 25 percent. Other nations experienced similar impacts. And cyclical unemployment lingered for a decade. An obvious inconsistency exists between a theory that says that unemployment is virtually impossible and the actual occurrence of a 10-year siege of substantial unemployment.

In 1936 British economist John Maynard Keynes (1883–1946) explained why cyclical unemployment could occur in a market economy. In his *General Theory of Employment, Interest, and Money*, Keynes attacked the foundations of classical theory and developed the ideas underlying the aggregate expenditures model. Keynes disputed Say's law, pointing out that not all income need be spent in the same period that it is produced. Investment spending, in particular, is volatile, said Keynes. A substantial decline in investment will lead to insufficient total spending. Unsold goods will accumulate in producers' warehouses, and producers will respond by reducing their output and discharging workers. A recession or depression will result, and widespread cyclical unemployment will occur. Moreover, said Keynes, recessions or depressions are not likely to correct themselves. In contrast to the more laissez-faire view of the classical economists, Keynes argued that government should play an active role in stabilizing the economy.

gap. It was fully employed, with an unemployment rate of 4.6 percent.

How could this outcome be? Doesn't the aggregate expenditure model suggest that large negative net exports reduce aggregate expenditures and therefore decrease equilibrium GDP, presumably to below its potential level? That undesirable outcome is possible, *other things equal*. But in 2007 large domestic consumption, investment, and government expenditures fully made up for the $560 billion of negative net exports. In 2007, U.S. consumers spent (in real terms) $8267 billion. Businesses invested $1831 billion, even though total U.S. saving was negative. The Federal government spent $2022 billion, financing more than one-fourth of that amount through borrowing.

Negative net exports—even large ones—do not preclude achieving full-employment output. Aggregate expenditures in total were sufficient in 2007 to purchase the potential output, with no unplanned changes in inventories. The $C_a + I_g + G$ expenditures were financed, in part, by foreigners whose large trade surpluses with the United States left them with equally large quantities of U.S. dollars. People and business abroad willingly lent many of those dollars to the United States in anticipation of high returns. That foreign lending in turn helped finance the high U.S. domestic spending.

QUICK REVIEW 28.3

- Government purchases shift the aggregate expenditures schedule upward and raise the equilibrium GDP.
- Taxes reduce disposable income, lower consumption spending and saving, shift the aggregate expenditures schedule downward, and reduce the equilibrium GDP.
- A recessionary expenditure gap is the amount by which an economy's aggregate expenditures schedule must shift upward to achieve the full-employment GDP; an inflationary expenditure gap is the amount by which the economy's aggregate expenditures schedule must shift downward to achieve full-employment GDP and eliminate demand-pull inflation.

Summary

1. The aggregate expenditures model views the total amount of spending in the economy as the primary factor determining the level of real GDP that the economy will produce. The model assumes that prices are fixed. Keynes made this assumption to reflect the general circumstances of the Great Depression and the fact that there existed such huge oversupplies of labor and other productive resources that increases in spending were unlikely to drive up prices.
2. For a private closed economy the equilibrium level of GDP occurs when aggregate expenditures and real output are equal or, graphically, where the $C + I_g$ line intersects the 45° line. At any GDP greater than equilibrium GDP, real output will exceed aggregate spending, resulting in unplanned investment in inventories and eventual declines in output and income (GDP). At any below-equilibrium GDP, aggregate expenditures will exceed real output, resulting in unplanned disinvestment in inventories and eventual increases in GDP.
3. At equilibrium GDP, the amount households save (leakages) and the amount businesses plan to invest (injections) are equal. Any excess of saving over planned investment will cause a shortage of total spending, forcing GDP to fall. Any excess of planned investment over saving will cause an excess of total spending, inducing GDP to rise. The change in GDP will in both cases correct the discrepancy between saving and planned investment.
4. At equilibrium GDP, there are no unplanned changes in inventories. When aggregate expenditures diverge from real GDP, an unplanned change in inventories occurs. Unplanned increases in inventories are followed by a cutback in production and a decline of real GDP. Unplanned decreases in inventories result in an increase in production and a rise of GDP.
5. Actual investment consists of planned investment plus unplanned changes in inventories and is always equal to saving.
6. A shift in the investment schedule (caused by changes in expected rates of return or changes in interest rates) shifts the aggregate expenditures curve and causes a new equilibrium level of real GDP. Real GDP changes by more than the amount of the initial change in investment. This multiplier effect ($\Delta GDP/\Delta I_g$) accompanies both increases and decreases in aggregate expenditures and also applies to changes in net exports (X_n) and government purchases (G).
7. The net export schedule in the model of the open economy relates net exports (exports minus imports) to levels of real GDP. For simplicity, we assume that the level of net exports is the same at all levels of real GDP.