# Chapter 8: The Aggregate Demand (AD)–Aggregate Supply (AS) Model: Short-Run **Analysis**

## Learning Objectives

**After studying this chapter, you should be able to**

**8.1** Differentiate between the demand for a particular product and aggregate demand

**8.2** Discuss the rationale for the shape of the aggregate demand curve

**8.3** Examine the factors that shift the *AD* curve

**8.4** Explain the meaning of aggregate supply

**8.5** Describe each of the three ranges that constitute the short-run aggregate supply curve

**8.6** Explain the factors that shift the *SRAS* curve

**8.7** Explain the determination of real output and the price level in a short-run equilibrium

**8.8** Analyze the effects of changes in aggregate demand on equilibrium real GDP and price

**8.9** Discuss the implications of the *AD–AS* model for demand-side policies

**8.10** Analyze the effects of changes in aggregate supply on equilibrium real GDP and price

**8.11** Discuss the implications of the *AD–AS* model for supply-side policies

## Assess Your Knowledge

1. If interest rates fall, other things being equal, what will happen to consumer spending? What will happen to spending by firms?
2. Describe three important factors that affect consumer spending.
3. What relationship would you expect to find between interest rates and investment?
4. Explain how changes in technology affect a country's aggregate supply.
5. What will happen to the price level if aggregate supply increases?

# Aggregate Demand

**LO 8.1** Differentiate between the demand for a particular product and aggregate demand

### Aggregate Demand

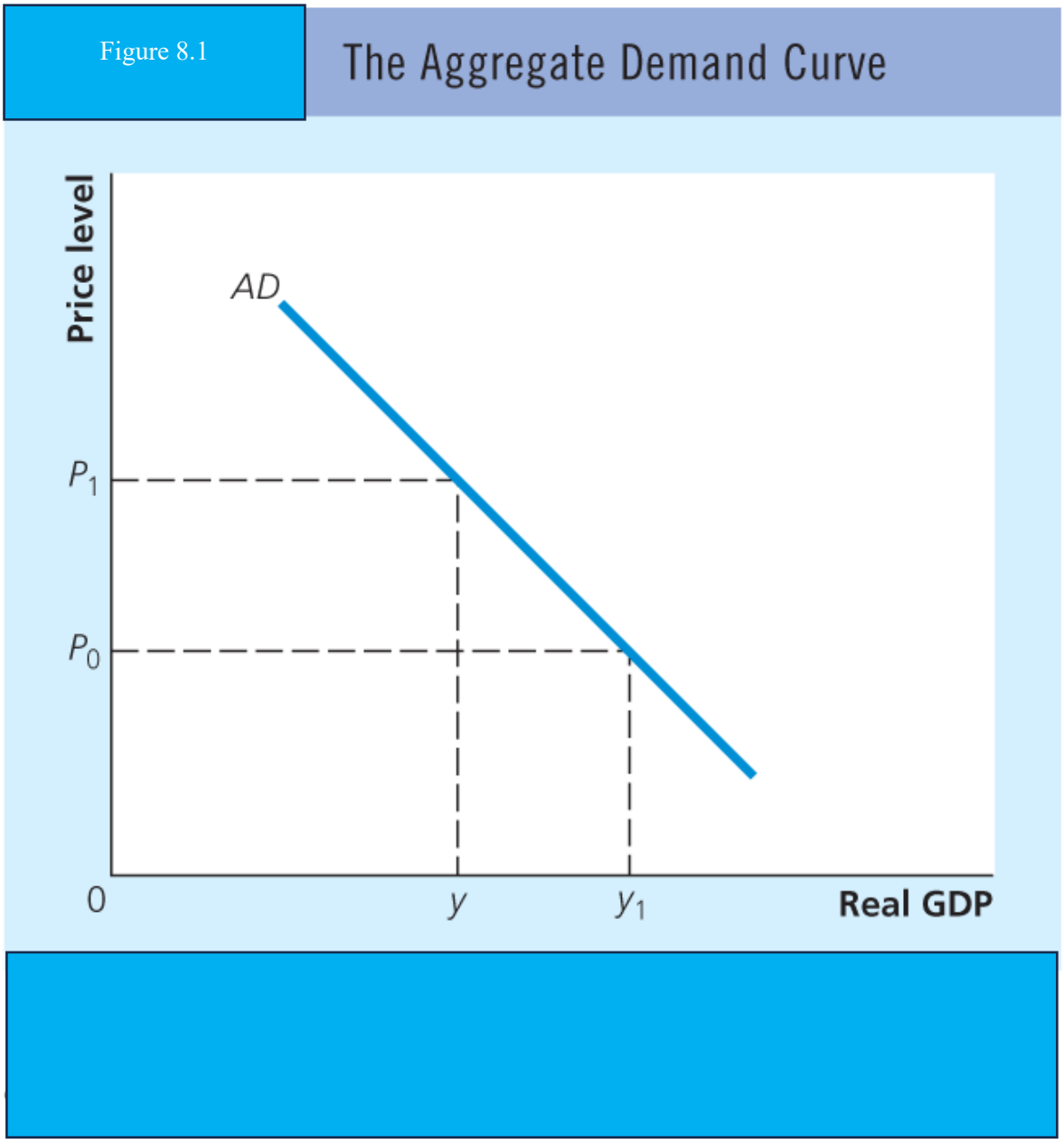
Aggregate demand refers to the total quantity of goods and services that households, businesses, governments, and foreign buyers are willing and able to purchase in an economy over a given period. It represents the relationship between the overall price level and the level of real output demanded. Unlike individual or market demand, aggregate demand captures

spending across the entire economy. It includes consumption, investment, government spending, and net exports. At each possible price level, aggregate demand shows the total real output that buyers plan to purchase.

### The Relationship Between Real Output and the Average Price

The quantity of real GDP demanded varies inversely with the average price level, consistent with the law of demand. When the price level decreases, households and firms can purchase more goods and services, leading to a rise in real GDP demanded. Conversely, when the price level increases, the purchasing power of money declines, reducing the quantity of real output demanded. This negative relationship explains why the aggregate demand curve slopes downward. It reflects how changes in the overall price level influence total spending in the economy, assuming other factors remain unchanged.

**Figure 8.1** **The Aggregate Demand Curve**




## The Aggregate Demand Curve

Like the demand curve for a single good, the aggregate demand curve represents the total demand across the entire economy. It shows the relationship between the overall price level

and the quantity of real GDP demanded. As the price level rises, the total amount of goods and services demanded decreases; as the price level falls, demand increases. The curve slopes downward, capturing this inverse relationship and illustrating how price changes affect total spending on final goods and services in the economy.

**aggregate demand curve** a graph that shows the relationship between the total amount of all goods and services that will be demanded at various price levels

### The Downward Slope of the Aggregate Demand Curve

The aggregate demand curve slopes downward—similar to an individual demand curve—because lower prices lead to greater real GDP demanded, and higher prices reduce it. At a price level of $P_o$, the total quantity of real output demanded is $Y_1$; at a higher price level $P_1$, the quantity demanded is Y. This inverse relationship, consistent with the law of demand, also applies to aggregate demand, though the underlying reasons differ.

## Reading Comprehension

1. What is meant by aggregate demand?
2. Sketch the aggregate demand (*AD*) curve, carefully labelling the diagram.

## Understanding the Aggregate Demand Curve

**LO 8.2** Discuss the rationale for the shape of the aggregate demand curve

### The shape of the aggregate demand curve

The downward slope of the aggregate demand curve cannot be explained in the same way as the demand curve for a single good. In microeconomics, the substitution effect and the income effect account for why a lower price leads to higher quantity demanded. These effects, however, do not operate at the macroeconomic level. Simply summing individual demand curves does not yield the aggregate demand curve—a mistake known as the fallacy of composition, which assumes that what is true for individual parts must also be true for the whole. Instead, the aggregate demand curve reflects economy-wide responses to changes in the price level and must be explained using macro-level mechanisms.

**fallacy of composition** the assumption that what is true of the parts must also be true of the whole

Instead, when the price level increases, the prices of resources—including labour—also increase, and so incomes rise as well. But because all prices and incomes rise together, purchasing power remains unchanged, and the quantity of real GDP demanded does not increase.

#### An Example of the Fallacy of Composition

Imagine an economy with only two products, A and B. If the price of A rises while the price of B and income stay the same, consumers are worse off; this reflects how demand works in a single market. But if the prices of both A and B, along with consumer incomes, all rise by 5%, purchasing power remains unchanged. This scenario illustrates aggregate demand. Evaluating the impact of a price change in A without considering what happens to B or to incomes misrepresents the broader picture. Assuming what is true for one good applies to the entire economy commits the fallacy of composition.

## Why the AD Curve Slopes Downward

The price level represents the average of all prices in the economy. When the price level increases, the total quantity of goods and services demanded typically declines. This inverse relationship underpins the downward slope of the aggregate demand (AD) curve. Total spending on final output—known as aggregate expenditure (AE)—is made up of four components: consumption (C), investment (I), government purchases (G), and net exports (X – M). This relationship is expressed as:

$$AE = C + I + G + (X - M)$$

Each component of AE responds differently to changes in the price level, contributing to the overall downward slope of the AD curve.

To see how the price level affects total output demanded, we examine its effect on each component of AE. These effects are the **interest rate effect, the foreign trade effect, and the real wealth effect.** We begin with the **interest rate effect.**

## The Interest Rate Effect

When the price level rises, goods and services become more expensive, and households and firms require more money to carry out their usual purchases. This increased demand for money, if the supply remains unchanged, puts upward pressure on interest rates. Higher interest rates make borrowing more

expensive. As a result, firms scale back investment in capital goods, and consumers reduce spending on items typically purchased with credit, such as vehicles, appliances, and vacations.

The decline in borrowing reduces both consumption (C) and investment (I), leading to a decrease in aggregate expenditure (AE). The resulting drop in total spending lowers the quantity of real output demanded. This relationship between rising interest rates and reduced spending on consumption and investment is known as the interest rate effect. It helps explain the downward slope of the aggregate demand curve.

**interest rate effect** the impact of changes in interest rates on consumption and investment and thus on total spending

## The Foreign Trade Effect

An increase in the price level in Canada means that, on average, Canadian goods become more expensive for foreign buyers, and foreign goods become relatively cheaper for Canadians. As a result, imports (M) rise and exports (X) decline. Thus, as the price level rises, the (X – M) component of aggregate expenditure falls. This reduction in AE leads to a decrease in the quantity of real output demanded. The effect of changes in the price level on exports and imports is referred to as the foreign trade effect. It captures how shifts in the price level influence international trade and total demand.

**foreign trade effect** the impact of changes in the price level on exports and imports and thus on the quantity of real GDP demanded

## The Real Wealth Effect

If the price level rises, holders of financial assets—such as savings accounts and bonds—experience a decline in purchasing power. Their real wealth decreases. This loss in real wealth reduces consumer spending. In other words, as the price level rises, the C component of AE falls; and this fall implies that less of the total real output will be demanded. The effect of changes in the price level on real wealth, and thus on the quantity of real GDP demanded, is called the real wealth effect.

> ***real wealth effect*** *the impact of changes in the price level on real wealth and thus on the quantity of real GDP demanded*

**BUSINESS SITUATION 8.1**

The Timing of Investment and the Interest Rate Effect

The interest rate effect explains how rising prices in the economy increase the demand for money, which pushes interest rates higher. Higher interest rates raise borrowing costs and discourage investment. As a business owner using aggregate demand as a guide, a good time to invest in capital equipment would be when prices are stable or falling, and interest rates are low. Lower interest rates reduce financing costs and make investment more attractive.

## Shifting the Aggregate Demand Curve

**LO 8.3** Examine the factors that shift the *AD* curve

### Reading Comprehension

1. What is the fallacy of composition? Provide an example to illustrate the fallacy.
2. Explain why the aggregate demand curve cannot be derived by adding all the demand curves for individual goods and services.
3. Why does the aggregate demand curve slope

### What Causes the Aggregate Demand Curve to Shift

Changes in the price level cause movements along the AD curve, not shifts. A shift in the AD curve occurs when aggregate expenditure (AE) changes at every price level. If any component of AE—consumption, investment, government spending, or net exports—changes, the AD curve will shift. An increase in government spending, investment, or exports—or a decrease in imports—raises AE and shifts the AD curve to the right. A decrease in government spending, investment, or exports—or an increase in imports—lowers AE and shifts the AD curve to the left.

## BUSINESS SITUATION 8.2

**Interpreting Changes in Demand**

You are the sales manager of a company that produces a wide variety of products for sale across the country. You have observed an increase in the aggregate quantity of goods and services purchased, including an increase in purchases from your company. **You interpret this as an increase in aggregate demand and respond by raising production and expanding your sales team.** At the same time, **you increase your product prices.**

**What mistake might you have made?**

## The factors that shift the ***AD*** curve

***AD* Shifters** To better appreciate the factors that can shift the AD curve, let us return to the components of aggregate expenditure (AE):

$$AE = C + I + G + (X - M)$$

Anything, apart from price level changes, that affects any of these components will cause the *AD* curve to shift. Factors that cause the aggregate demand curve to shift are known as ***AD* shifters** (or **demand-side shocks**).

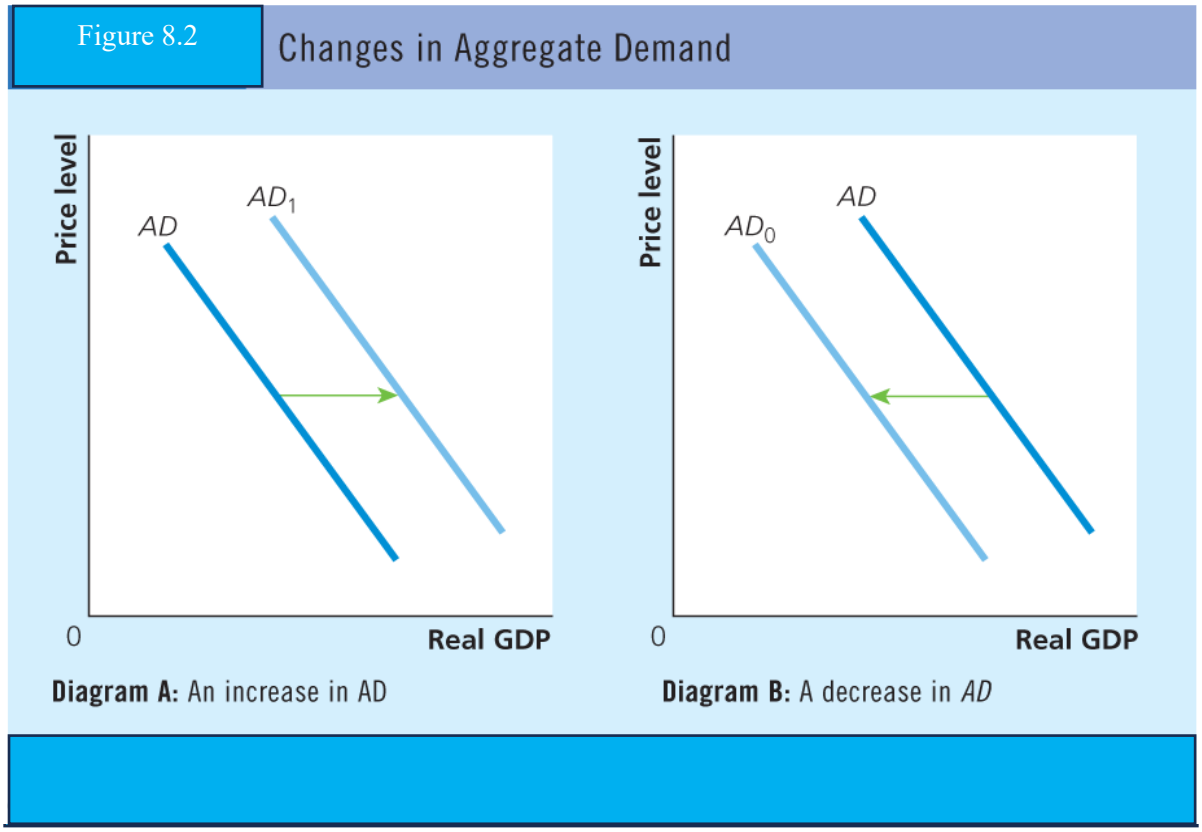
The factors that can shift the aggregate demand curve are called *AD shifters* and are components of aggregate expenditure: consumption, investment, government spending, and net exports.

We can now identify some major *AD* shifters and briefly analyze their effects on *AD*. Let us begin with consumption

**Figure 8.2** Changes in Aggregate Demand

**Diagram A:** An increase in AD

**Diagram B:** A decrease in *AD*




***AD* shifters or demand-side shocks** factors that cause the aggregate demand curve to shift

.Non-Price Determinants of Consumer Spending

Consumer wealth, taxes, expectations, and interest rates are non-price-level determinants of consumer spending. Each can cause the aggregate demand curve to shift.

**Consumer Wealth**

If the price level remains constant and consumer wealth increases—for example, through rising property values—consumers tend to spend more. This increase in spending raises AE and shifts the AD curve to

the right. A drop in wealth—such as from falling home values or stock prices—reduces consumption and shifts the AD curve to the left.

### Taxes

A reduction in personal income taxes raises disposable income. At each price level, consumers can buy more goods and services. This raises AE and shifts the AD curve to the right. Tax increases reduce disposable income, lower consumption, and shift the AD curve to the left.

### Expectations

If consumers expect better economic conditions ahead—higher future income or job security, for instance—they increase current spending. This optimism boosts AE and shifts the AD curve to the right. Pessimistic expectations cause the opposite effect.

### Interest Rates

Spending on automobiles, appliances, and vacations is sensitive to interest rates. If the price level is constant and interest rates fall, borrowing becomes cheaper, encouraging spending. This lifts AE and shifts the AD curve to the right. Rising interest rates discourage borrowing, reduce consumption, and shift the AD curve to the left.

## The Effect of Investment Spending on the AD Curve

Investment, the purchase of capital goods, is a key component of AE. Changes in investment spending shift the aggregate demand curve, holding the price level constant. Several non-price factors influence investment.

### Interest Rates

Declining interest rates reduce the cost of borrowing, which increases investment spending. Higher investment raises AE and shifts the AD curve to the right. Rising interest rates increase borrowing costs, reduce investment, and shift the AD curve to the left.

### Changes in Consumer Expectations

Shifts in consumer expectations can influence aggregate demand independently of changes in the price level. When consumers expect higher future income or improved economic conditions, they are more likely to increase current spending. AE increases. This rise in consumption raises aggregate expenditure and shifts the aggregate demand (AD) curve to the right. In contrast, if consumers anticipate job losses or an economic downturn, they tend to cut back on spending, even if prices remain unchanged. This reduction in consumption shifts the AD curve to the left. Changes in consumer expectations, therefore, play a key role in determining the position of the AD curve.

### Perceived Profitability of Investment Projects

If firms expect strong returns from new projects, they will invest more. This raises AE and shifts the AD curve to the right. Weak profit expectations reduce investment and shift the AD curve to the left.

**Technological Advance**

Technological innovations create new investment opportunities. For example, advances in computing have triggered waves of investment across multiple sectors. These innovations raise investment and shift the AD curve to the right.

## Government Spending and the AD Curve

Autonomous changes in government spending—those made independently of the current level of income or output—can shift the aggregate demand (AD) curve. An increase in government purchases of goods and services at every price level raises aggregate expenditure (AE) and shifts the AD curve to the right, assuming other conditions remain constant. For instance, if the federal government orders a new fleet of helicopters or commissions the construction of submarines to expand military capacity, this injection of spending boosts demand for labor, materials, and related services across the economy. The effect is a rightward shift of the AD curve.

Conversely, reductions in autonomous government spending—such as cuts to health care funding, education programs, or public infrastructure—lower aggregate expenditure and shift the AD curve to the left. Because government purchases are a direct component of AE, changes in public spending exert an immediate and directional influence on the overall level of demand in the economy.

## Net Exports and the Aggregate Demand Curve

Net exports (X – M) can shift the aggregate demand (AD) curve. Any non-price-level factor that affects exports or imports influences net exports and, consequently, the AD curve. For instance, if U.S. incomes rise, Americans may purchase more Canadian goods, increasing Canada's exports to the U.S. This boost in exports raises aggregate expenditure (AE), shifting the AD curve to the right. Similarly, if the Canadian dollar depreciates relative to the U.S. dollar, Canadian goods become more affordable to Americans, leading to increased exports. At the same time, U.S. goods become relatively more expensive for Canadians, reducing imports. This combination increases net exports, raises AE, and shifts the AD curve to the right.

## Recent Example: Trade Balance and Depressed Net Exports (2018–2023)

Between 2018 and 2023, the Canadian dollar **depreciated** modestly, moving from an average of US$0.77 to about US$0.74. Normally, this would support Canadian exports and reduce imports. Yet, during the same period, Canada’s merchandise trade balance deteriorated. In 2022, the country posted a surplus of $19.7 billion, but by 2023, this shifted to a deficit of $1.9 billion. The reversal stemmed from a 1.4% decline in exports to $768.2 billion and a 1.4% increase in imports to $770.2 billion (**Statistics Canada**: https://www150.statcan.gc.ca/n1/daily-quotidien/240509/dq240509a-eng.htm). This trade deficit,

despite a weaker Canadian dollar, reflects other influences—declining foreign demand for Canadian resources and manufactured goods, and strong Canadian demand for imported consumer products. The resulting decline in net exports reduced AE and shifted the AD curve to the left.

## Aggregate Supply

**LO 8.4** Explain the meaning of aggregate supply

### What is aggregate supply

**Reading Comprehension**

1. What are demand-side shocks?
2. Identify some of the factors that will cause the *AD* curve to shift.
3. Describe the effect on the *AD* curve of (i) an increase in government spending; (ii) a decrease in exports.

Aggregate supply refers to the total supply of all goods and services in the economy during a particular period. More specifically, aggregate supply refers to the various levels of real GDP that will be produced—quantities that firms are willing and able to provide—at different price levels.

**aggregate supply** the total supply of all goods and services in the economy during a specific period; the various quantities of output that will be supplied at various price levels

This definition makes it clear that aggregate supply describes the relationship between real GDP and the price level. The concept parallels the supply of an individual good or service.

#### The Relationship Between Real Output Supplied and the Price Level

The relationship between the quantity of real GDP supplied and the average level of prices follows the logic of the law of supply. As the price level falls, other things being equal, the quantity of real GDP supplied falls; and as the price level increases, the quantity supplied increases. This direct relationship reflects how higher prices provide an incentive for firms to expand output.

##### Why We Cannot Add Individual Supply Curves

Just as it would be erroneous to derive the aggregate demand curve by adding individual demand curves, it is also incorrect to derive the aggregate supply curve by summing individual supply curves. An individual supply curve holds all other prices constant, varying only the price of the good in question. In contrast, the aggregate supply curve varies the economy's average price level.

## The Role of Time in Aggregate Supply

On the supply side, macroeconomic analysis distinguishes between the short run and the long run. This chapter focuses on the short run; the long-run analysis appears in Chapter 9.

## The Short Run in Aggregate Supply

The short run refers to a period when firms cannot adjust all inputs or productive resources. Some costs remain fixed. In this context, we assume input prices stay constant, while output prices can change. As a result, firms may increase output when prices rise, even though some production costs do not adjust immediately.

> ***short run*** *a situation in which firms cannot vary all their inputs or productive resources; thus, they operate with some fixed costs*

In the short run, because some resource costs are fixed, changes in the average level of prices influence firms' decisions regarding real output. For example, if the price level rises, while some costs remain fixed, firms have an incentive to increase output in order to make more profits. Higher output prices combined with fixed costs raise profit margins and encourage expanded production.

The short-run aggregate supply curve can be used to illustrate the total supply of all goods and services in a manner similar to the supply curve for an individual good. The short-run aggregate supply curve is a graph that shows the various levels of real GDP that will be produced at different price levels in the short run.

> ***short-run aggregate supply curve*** *a graph that shows the various levels of real GDP that will be supplied at various price levels in the short run*

## The Shape of the Short-Run Aggregate Supply Curve

At first glance, it may seem natural to assume that the short-run aggregate supply (SRAS) curve resembles the supply curve for a single good, upward sloping as price rises. This is generally correct: the SRAS curve typically slopes upward, indicating that as the overall price level increases, firms are willing to produce more output. However, the curve's shape is not uniform throughout. It varies depending on how close the economy is to its productive capacity. At low levels of output, spare capacity allows firms to expand production without raising prices much. As the economy approaches full capacity, further increases in output require higher prices, making the curve steeper.

## Understanding the Aggregate Supply Curve

**LO 8.5** Describe each of the three ranges that constitute the short-run aggregate supply curve

### Sections of the Short-Run Aggregate Supply Curve

The short-run aggregate supply curve can be divided into three sections or ranges, as shown in Figure 8.3.

For a level of real output (GDP) from 0 to y, the short-run aggregate supply curve is horizontal. For real output levels from Y to $Y_1$, it is upward sloping. When real output reaches $y_1$, the curve becomes vertical.

## Why the Three Sections Differ

Let us address this issue by examining each section in turn.

### Reading Comprehension

1. What is aggregate supply?
2. What is the short run as it applies to aggregate supply?
3. What is the short-run aggregate supply curve?

### The Horizontal Section (Keynesian Range)

If the economy is operating at low levels of real output and employment, then increasing GDP is possible without any noticeable rise in the price level. This horizontal section is known as the **Keynesian range**, named after John Maynard Keynes, whose analysis during the Great Depression emphasized high unemployment and underused capacity.

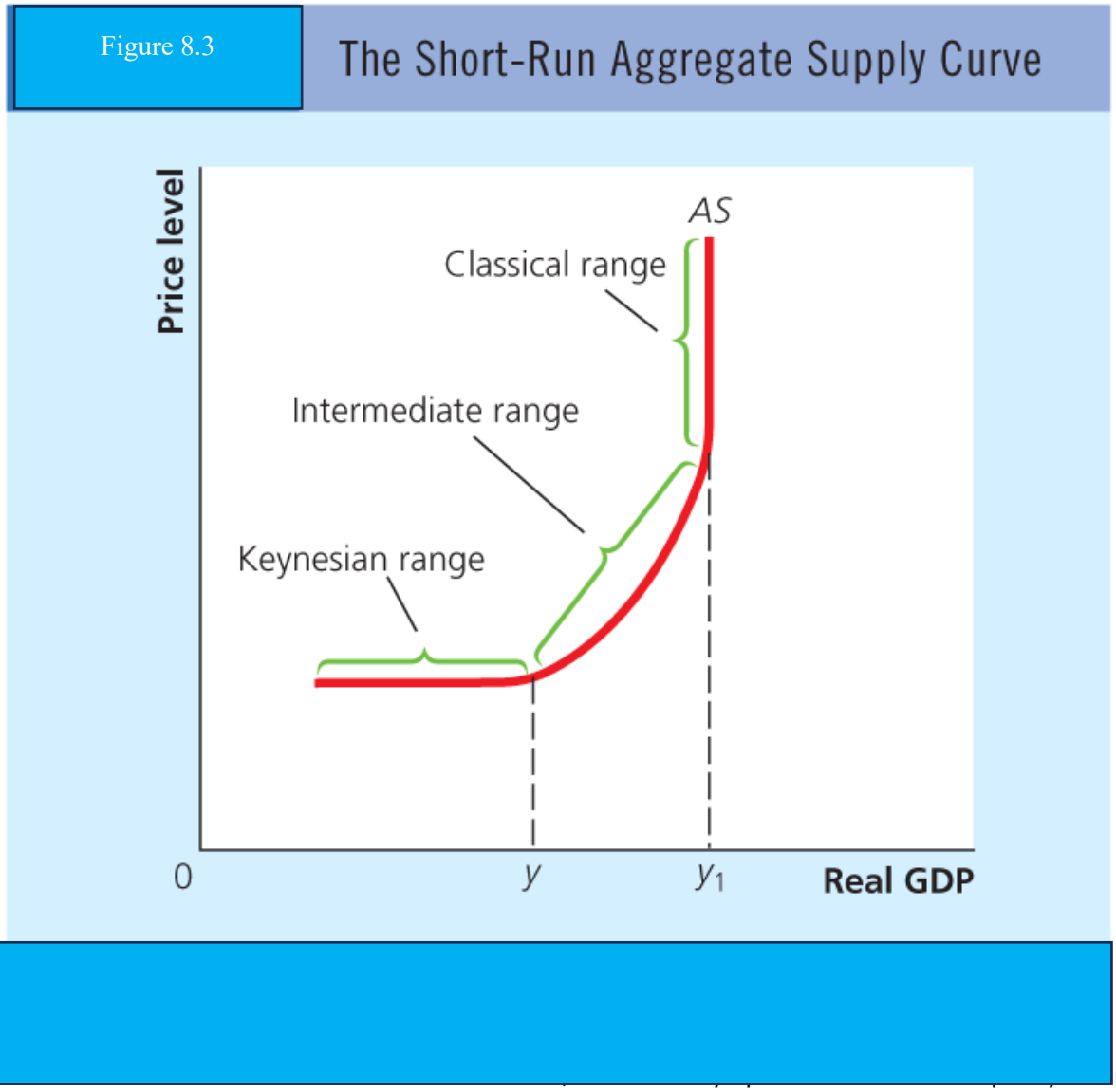
In this range, significant numbers of unemployed workers and idle resources allow firms to raise output without facing higher costs. Average production costs remain steady, so firms do not require higher prices to justify increased production.

During the 2008–2009 recession, Canada's unemployment rate rose to 8.3%, and GDP fell well below its potential. At that time, the Canadian economy was likely operating in the Keynesian range. A similar pattern emerged in 2020 during the COVID-related recession, when public health restrictions caused large sectors of the economy to shut down. Unemployment reached 13.7% in May 2020 (Statistics Canada: https://www150.statcan.gc.ca/n1/daily-quotidien/200605/dq200605a-eng.htm). Initial

recovery saw GDP rise with minimal upward pressure on prices—an outcome consistent with the horizontal portion of the short-run AS curve.

> ***Keynesian range:*** *the horizontal section of the AS curve that represents high unemployment and low real GDP.*

**Figure 8.3 The Short-Run Aggregate Supply Curve**



GDP can rise without pressure on prices. In other cases, output and employment reach high levels.

Firms can raise output slightly. They can run machines longer, offer overtime, or increase work intensity. But overall expansion under these conditions becomes difficult. Production costs rise, and inflationary pressure follows. The Keynesian and classical ranges illustrate the limits of output expansion in the short run.

## Shifting the Aggregate Supply Curve

**LO 8.6** Examine the factors that shift the *SRAS* curve

### What Causes the Short-Run AS Curve to Shift

A change in the price level does not shift the short-run aggregate supply (AS) curve, just as a change in the price of a specific good does not shift that good's supply curve. The short-run AS curve reflects the behaviour of all firms that produce total output in the economy.

**Changes in production costs can shift the curve.** At any given price level, firms will produce more or less real output depending on their cost structures. A reduction in production costs shifts the short-run AS curve to the right. An increase in costs shifts it to the left.

**Events that disrupt the economy's productive capacity—natural disasters, for example—can also shift the short-run AS curve.** An earthquake, a flood, or any major shock to resource availability or infrastructure will reduce output at each price level and push the curve leftward.

## Reading Comprehension

1. What is another name for the horizontal section of the *AS* curve?
2. Discuss the level of real output consistent with the classical range of the *AS* curve.
3. Is expansion in the short run possible if the economy is operating in the vertical range of the *AS* curve?
4. Why are the horizontal and vertical sections of the *AS* curve described as "extreme cases"?

## Factors That Shift the Short-Run Aggregate Supply Curve

We can—and should—analyze the determinants of aggregate supply. These non-price-level factors influence firm behaviour and shift the short-run AS curve. They include production costs, changes in resources, technological developments, tax policies, and natural or social disruptions.

**AS shifters or supply-side shocks** — factors that cause the aggregate supply curve to shift.

### Production Costs

A rise in production costs moves the AS curve to the left. For example, if labour becomes scarce and wages rise, or if the price of essential inputs—oil, for instance—increases, firms face higher costs and produce less at any given price level. A reduction in production costs has the opposite effect, shifting the AS curve to the right.

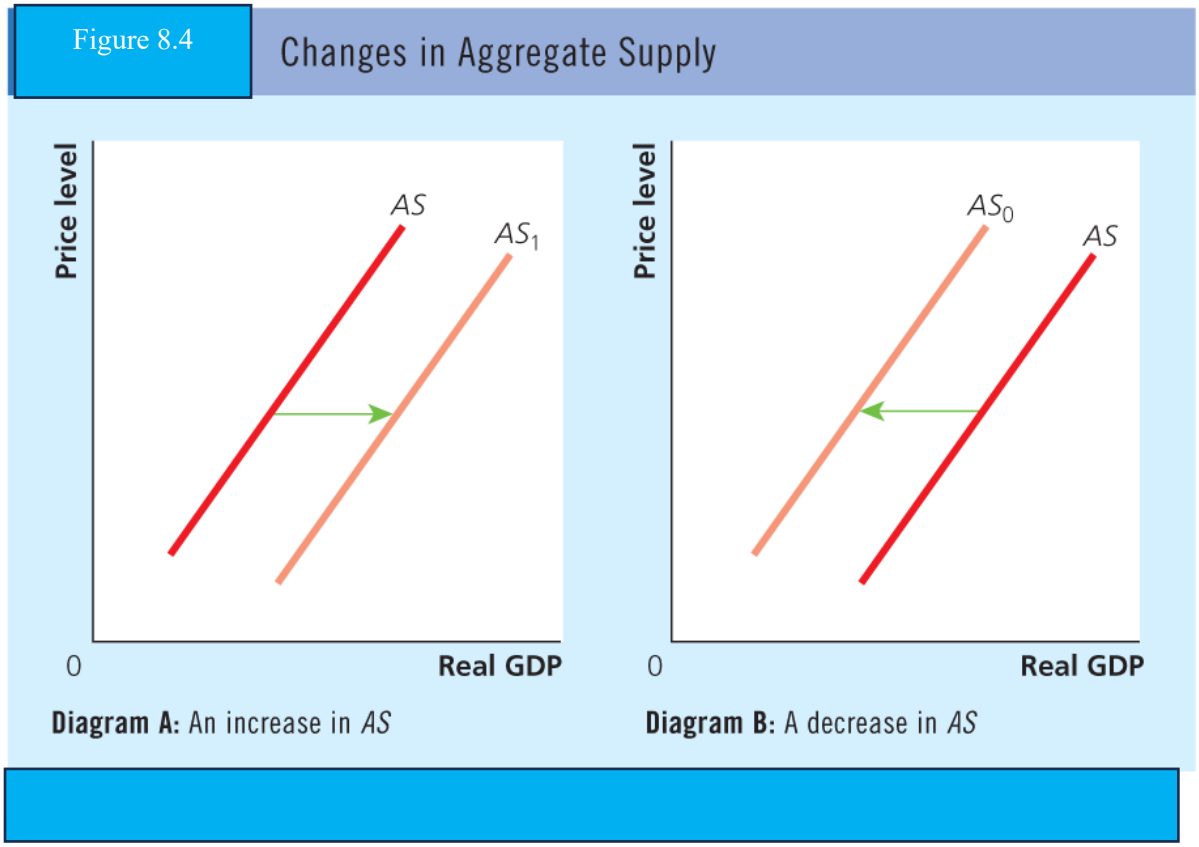
### Quantity or Quality of Resources

An increase in available resources—land, labour, or capital—shifts the AS curve to the right. A more skilled workforce also increases productivity and output, producing the same effect. Canada's short-run AS curve shifts right when immigration expands the labour pool. Destruction of resources—through wildfires, pollution, or depletion of fish stocks—shifts the AS curve to the left.

**Figure 8.4 Changes in Aggregate Supply**

**Diagram A: An increase in *AS***

**Diagram B: A decrease in *AS***




### Technology

Advances in technology raise output per unit of input. When firms adopt more efficient methods of production, the economy generates more real output from the same quantity of resources. The AS curve shifts to the right.

### Tax Policy

Lower taxes on business reduce production costs and shift the AS curve to the right. Higher taxes increase costs and move the curve leftward. For example, the introduction of the goods and services tax (GST) in Canada in 1991 increased business costs and likely shifted the AS curve to the left.

### Natural and Other Disasters

Events that disrupt production—wildfires, floods, droughts, or political instability—push the AS curve to the left. The wildfires across British Columbia and Alberta in 2023 destroyed property, reduced labour availability, and disrupted transport networks. Earthquakes in Turkey and Syria in early 2023 devastated factories, roads, and energy supplies. The war in Gaza, which escalated sharply in late 2023, destroyed homes, public facilities, and infrastructure, as well as disrupted regional trade and energy markets. These shocks lowered productive capacity and shifted the short-run AS curve to the left. Russia's war in Ukraine had similar effects across Europe by interrupting access to raw materials and forcing energy prices higher.

## BUSINESS SITUATION 8.3

**The Effect of Lower Business Taxes on Prices**

A reduction in business taxes lowers production costs across the economy. **Firms can produce more output at each price level, which shifts the short-run aggregate supply (AS) curve to the right.** As a result, the overall level of prices is expected to fall, assuming aggregate demand remains constant.

Firms should expect **downward pressure on prices**, an increase in real output, and improved profit margins—**a combination that supports both expansion and price stability.**

**What changes should firms expect in the overall level of prices resulting from the proposed reduction in taxes?**

A summary of all of the *AD–AS* shifters is presented in Table 8.1.

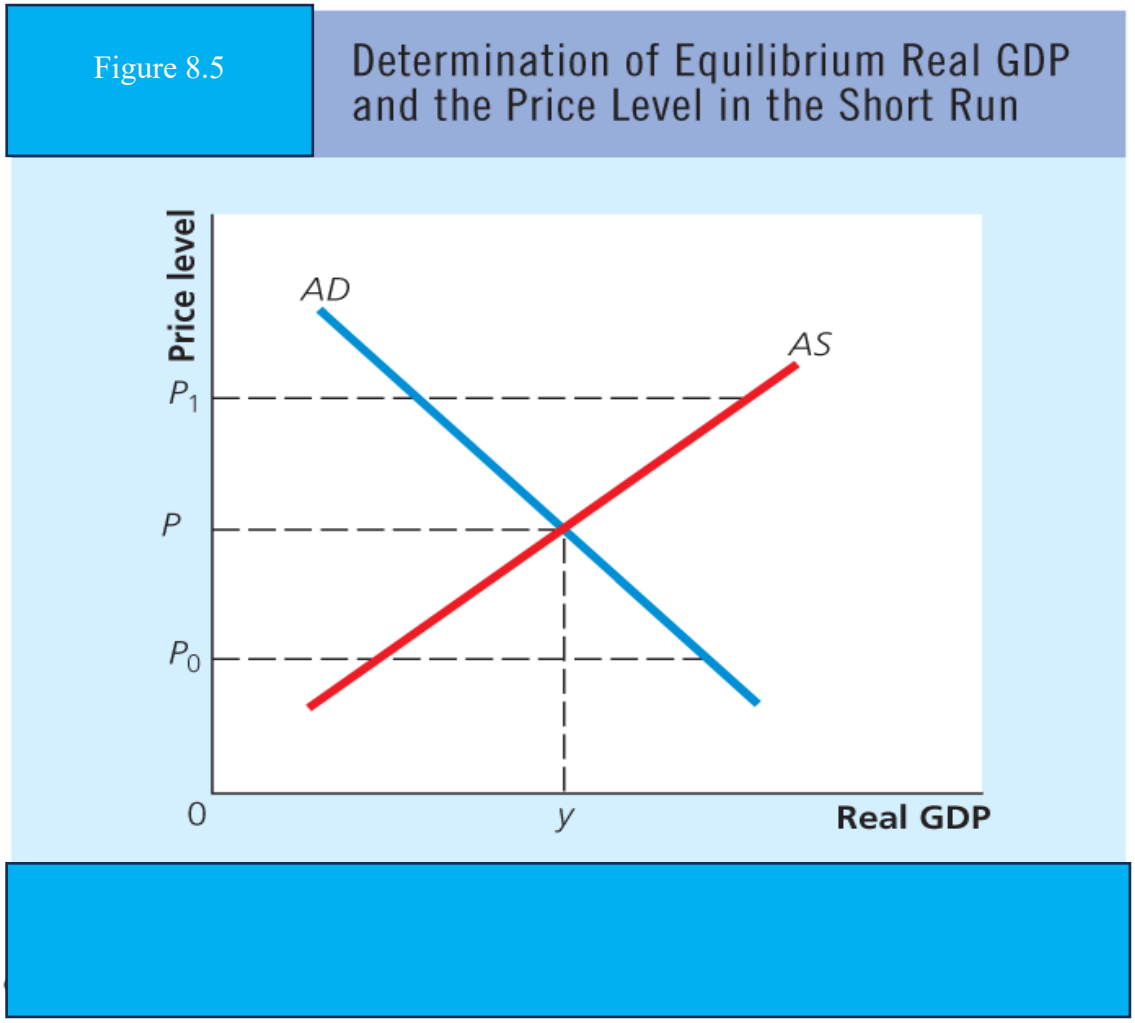
**Table 8.1 Summary of Aggregate Demand and Aggregate Supply Shifters**

| AD Shifters | AS Shifters |
|---|---|
| **1. Consumption** | **1. Production Costs** |
| a. Consumer wealth | a. Labour costs |
| b. Taxes | b. Changes in other input prices |
| c. Expectations | **2. Changes in Quantity and/or Quality of Resources** |
| d. Interest rates | a. Land |
| **2. Investment** | b. Labour |
| a. Interest rates | c. Capital |
| b. Changes in income | d. Entrepreneurial ability |
| c. Perceived profitability of investment projects | **3. Changes in Technology** |
| d. Technological advance | **4. Tax Policies** |
| **3. Government Spending** | **5. Natural and Other Disasters** |
| **4. Net Exports** | |
| a. Increases in income abroad | |
| b. Changes in exchange rates] | |

## Reading Comprehension

1. What are supply-side shocks?
2. What are the main factors that will cause the short-run *AS* curve to shift?
3. How will increases in production costs affect the short-run *AS* curve?

**Figure 8.5** **Determination of equilibrium real GDP** and the price level in the short run




## Short-Run Equilibrium of Real Output and the Price Level

**LO 8.7** Explain the determination of real output and the price level in a short-run equilibrium

### Short-Run Equilibrium: Bringing AD and AS Together

Short-run aggregate demand (AD) and short-run aggregate supply (AS) intersect to determine the equilibrium level of real GDP and the equilibrium price level. This approach mirrors the analysis in Chapter 3, which explained how price and quantity are determined in a single-product market.

Any price level above P—for example, $P_1$—leads to an output level greater than what buyers wish to purchase. The result is unsold goods, falling prices, and a decline in real GDP. Any price level below P—for example, $P_o$—leads to output that falls short of what buyers want to purchase. This shortage causes prices and real GDP to rise.

Only at price level P does the total quantity of goods and services demanded equal the total quantity supplied. At this point, the economy reaches equilibrium. Price level P is the equilibrium price level, and output level Y is the equilibrium level of real GDP.

> ***Equilibrium price level**: the price at which quantity demanded equals quantity supplied.*
> ***Equilibrium level of real GDP:** the level of real GDP at which the AD and AS curves intersect.*

## Effects of Changes in Aggregate Demand

**LO 8.8** Analyze the effects of changes in aggregate demand on equilibrium real GDP and price

### Effects of AD Changes on GDP and Prices

**Reading Comprehension**

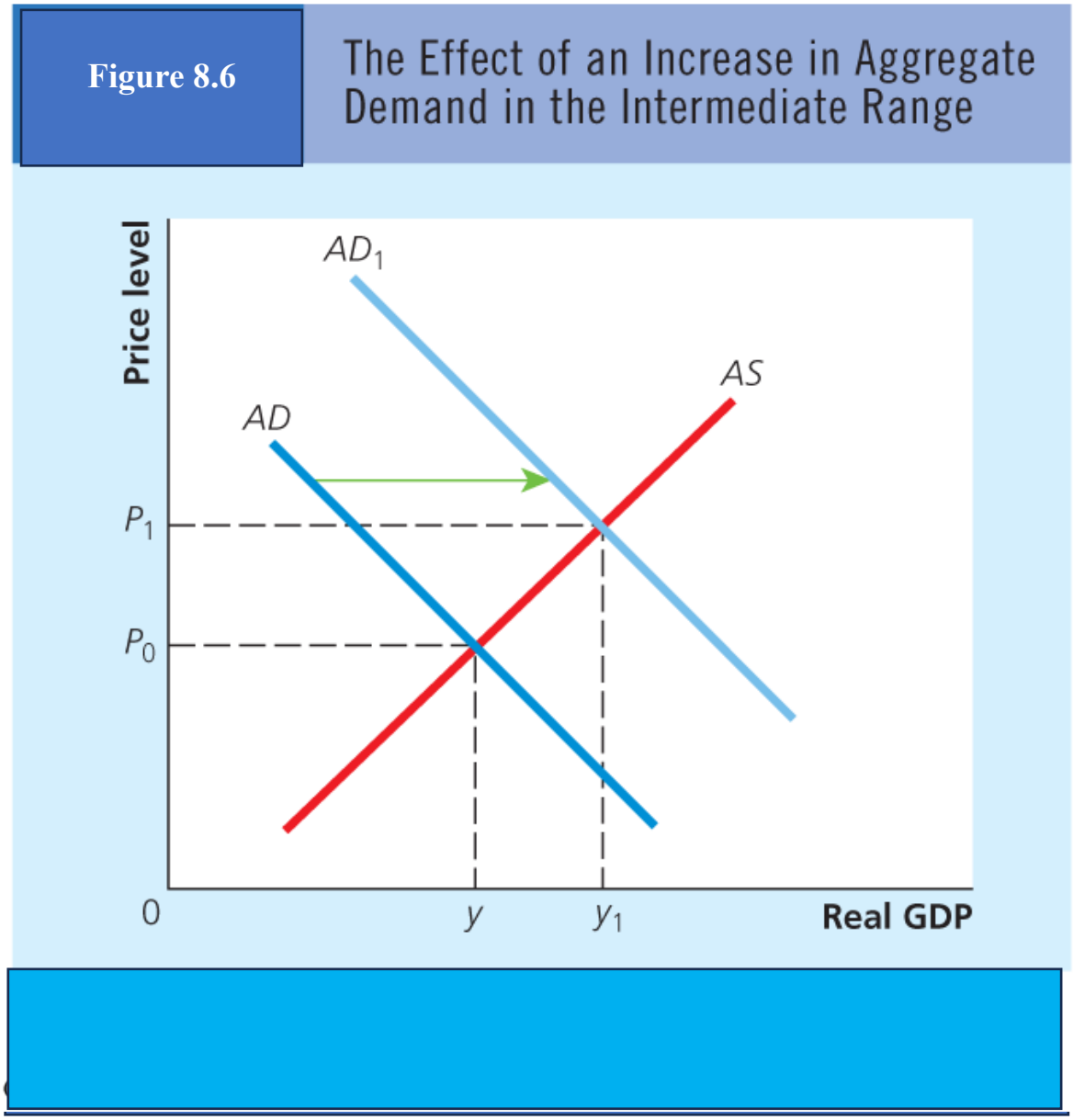
1. Explain the determination of the short-run equilibrium real GDP and the equilibrium price level.
2. How do we determine the equilibrium price level?

The impact of a change in aggregate demand depends on where the AD curve intersects the short-run AS curve—whether in the Keynesian (horizontal), intermediate (upward sloping), or classical (vertical) range.

### AD Increase in the Intermediate Range

If the AD curve intersects the upward-sloping portion of the AS curve, both the price level and real GDP increase. A shift of the AD curve from AD to $AD_1$ raises the price level from P to $P_1$ and increases real GDP from Y to $Y_1$. In this range, rising demand creates both inflation and output growth.

**Figure 8.6 The Effect of an Increase in Aggregate Demand in the Intermediate Range**

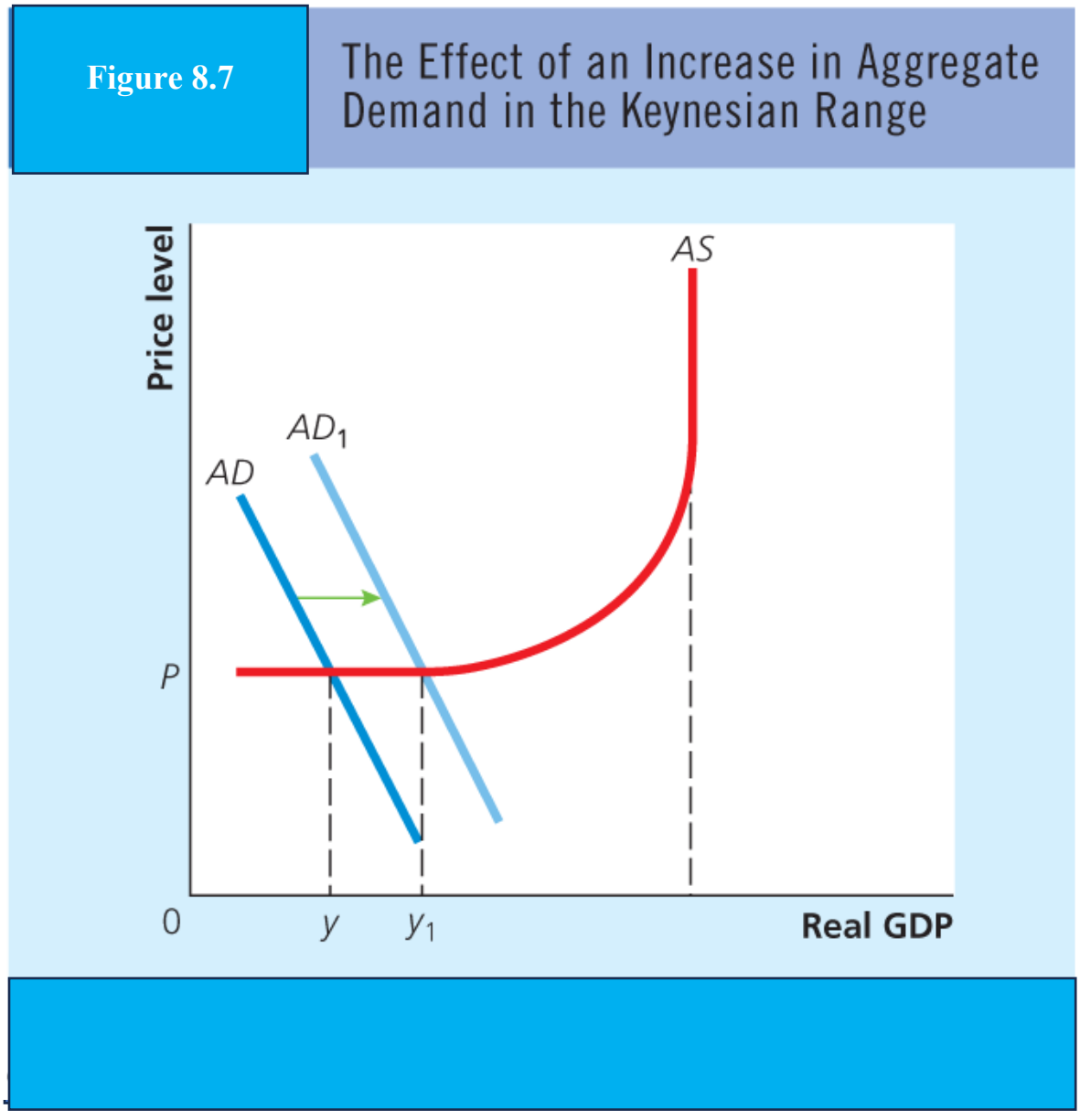



### AD Increase in the Keynesian Range

If the AD curve intersects the horizontal portion of the AS curve, real GDP increases but the price level remains stable. A shift in aggregate demand from AD to $AD_1$ raises output from $y_0$ to $y_1$ while the price

level stays at P. This outcome reflects excess capacity and high unemployment, which allow output to expand without price pressure.

**Figure 8.7 The Effect of an Increase in Aggregate Demand in the Keynesian Range**

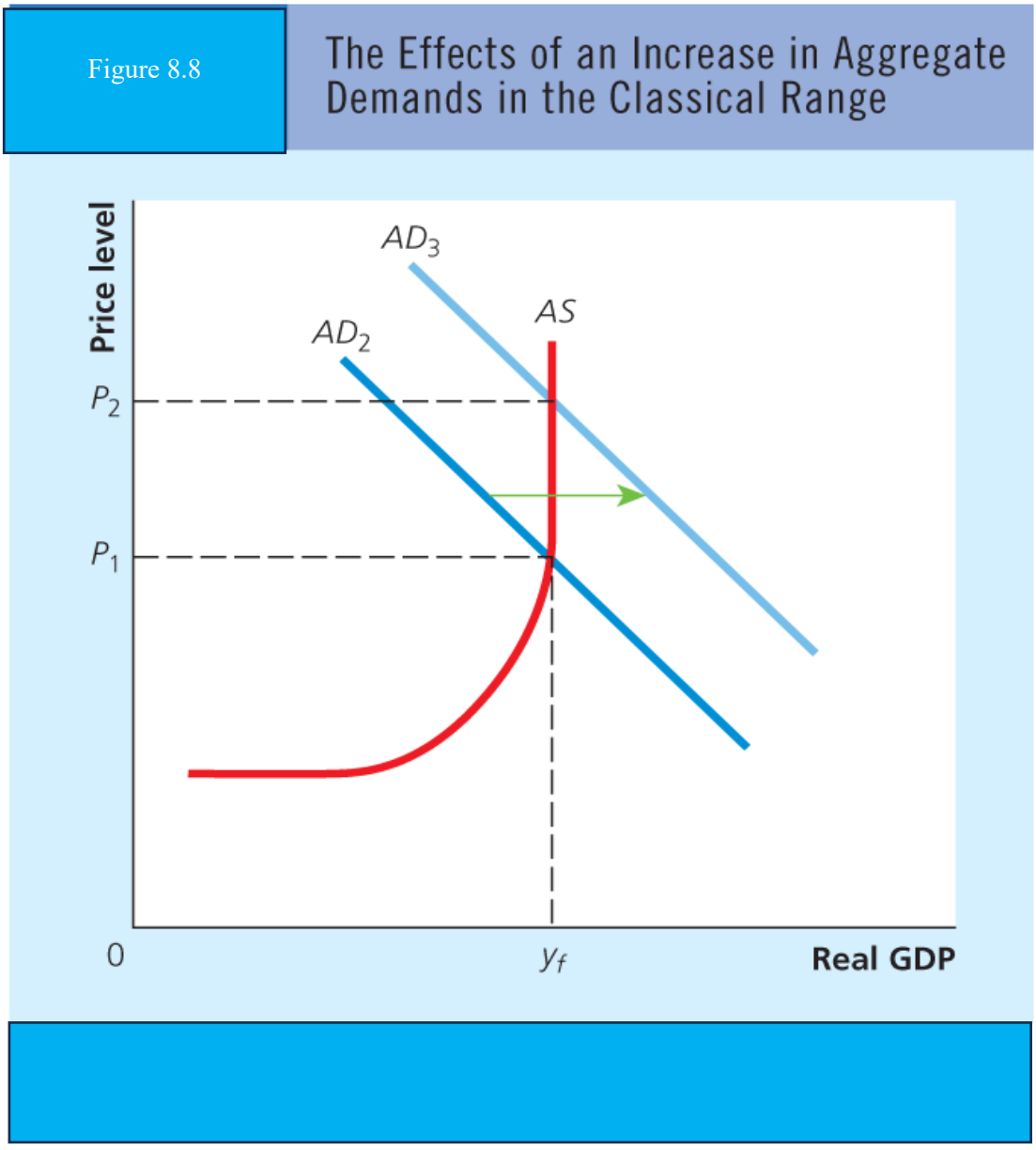


### AD Increase in the Classical Range

If the AD curve intersects the vertical portion of the AS curve, the economy is operating at full employment. A shift in aggregate demand from $AD_2$ to $AD_3$ raises the price level from $P_1$ to $P_2$, but real GDP remains unchanged. Firms cannot produce more output because all resources are fully utilized.

An increase in aggregate demand in the classical range raises the equilibrium price level but does not affect equilibrium real GDP.

**Figure 8.8 The Effects of an Increase in Aggregate Demands in the Classical Range**



## The Effects of a Decrease in AD

### Reading Comprehension

**1.** Sketch the effects of an increase in *AD* if the intersection occurs in the Keynesian range of the *AS* curve.

**2.** In what range of the *AS* curve will a shift in *AD* have *no effect* on equilibrium price?

**3.** In what range of the *AS* curve will a shift in *AD* have *no effect* on equilibrium real GDP?

**4.** Repeat the analysis of a change in aggregate demand given above, this time illustrating a decrease in *AD* (a leftward shift) for all three ranges of the *AS* curve. Summarize the effects on equilibrium real GDP and the price level.

- The effects of a decrease in aggregate demand depend on the section of the AS curve where the shift occurs.
- In the **Keynesian range**, real GDP falls while the price level remains constant.
- In the **intermediate range**, both real GDP and the price level decline.
- In the **classical range**, only the price level drops; output stays fixed at full employment.

## Demand-Side Policies

**LO 8.9** Discuss the implications of the *AD–AS* model for demand-side policies

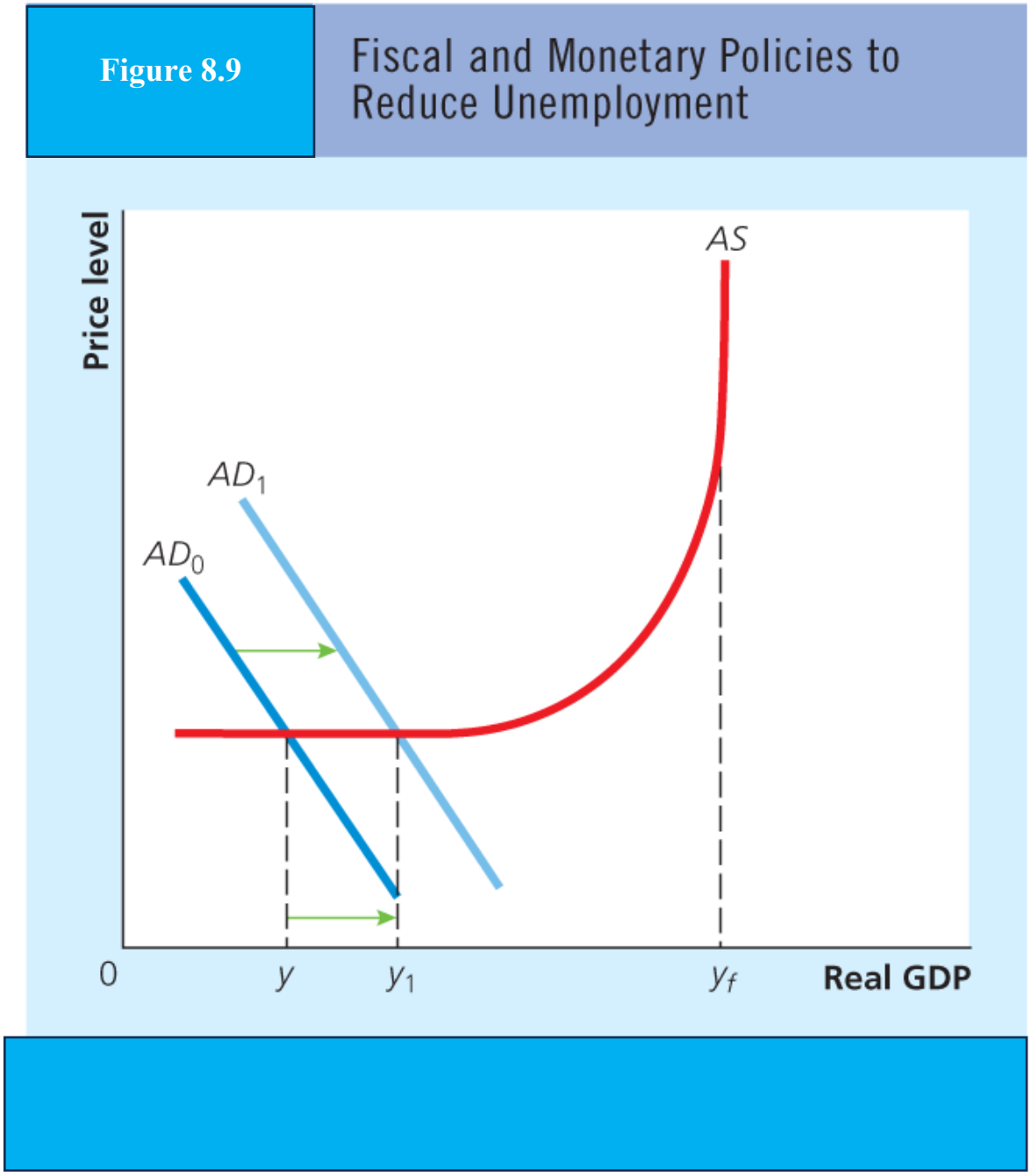
**Demand-Side Policies**

Demand-side policies are actions that shift the aggregate demand (AD) curve. Changes in aggregate demand influence real GDP and the price level, depending on the section of the short-run AS curve that is affected.

The government can influence aggregate expenditure (AE) and shift the AD curve either to the right or to the left. Two primary tools are used for this purpose:

**Fiscal policy:** the deliberate use of government spending and taxation to influence aggregate demand.
**Monetary policy** : changes in the money supply and interest rates by the central bank to influence aggregate demand.

**Figure 8.9** **the effects of expansionary fiscal and monetary on unemployment**




Because these policies play a central role in stabilizing the economy, later chapters examine them in detail.

## How Demand-Side Policies Work

Government purchases of goods and services (G) form part of aggregate expenditure (AE). By increasing its own spending or reducing taxes to raise household and business spending, the government can shift the AD curve to the right. The Bank of Canada can also raise AE by lowering interest rates. Lower rates reduce borrowing costs, stimulate investment, and increase consumer spending. These policies influence demand through channels that have a direct and measurable effect on aggregate expenditure.

## Reducing Unemployment

Lowering unemployment is a central objective of fiscal and monetary policy. Suppose the unemployment rate reaches 20%, as it did during the Great Depression. At that point, the economy operates well below its full-employment output—far from the vertical section of the short-run AS curve.

This situation places the economy within the horizontal (Keynesian) range of the AS curve, where large numbers of idle resources exist. In this case, fiscal policy—shifting the AD curve from $AD_0$ to $AD_1$—can raise output without raising prices. The Bank of Canada can generate the same effect through monetary policy. Because the economy is far below capacity, these demand-side measures expand output and employment without causing inflation.

### Reading Comprehension

1. What are demand-side policies?
2. Explain how the government and the Bank of Canada can use fiscal and monetary policies to combat (i) inflation and (ii) unemployment.

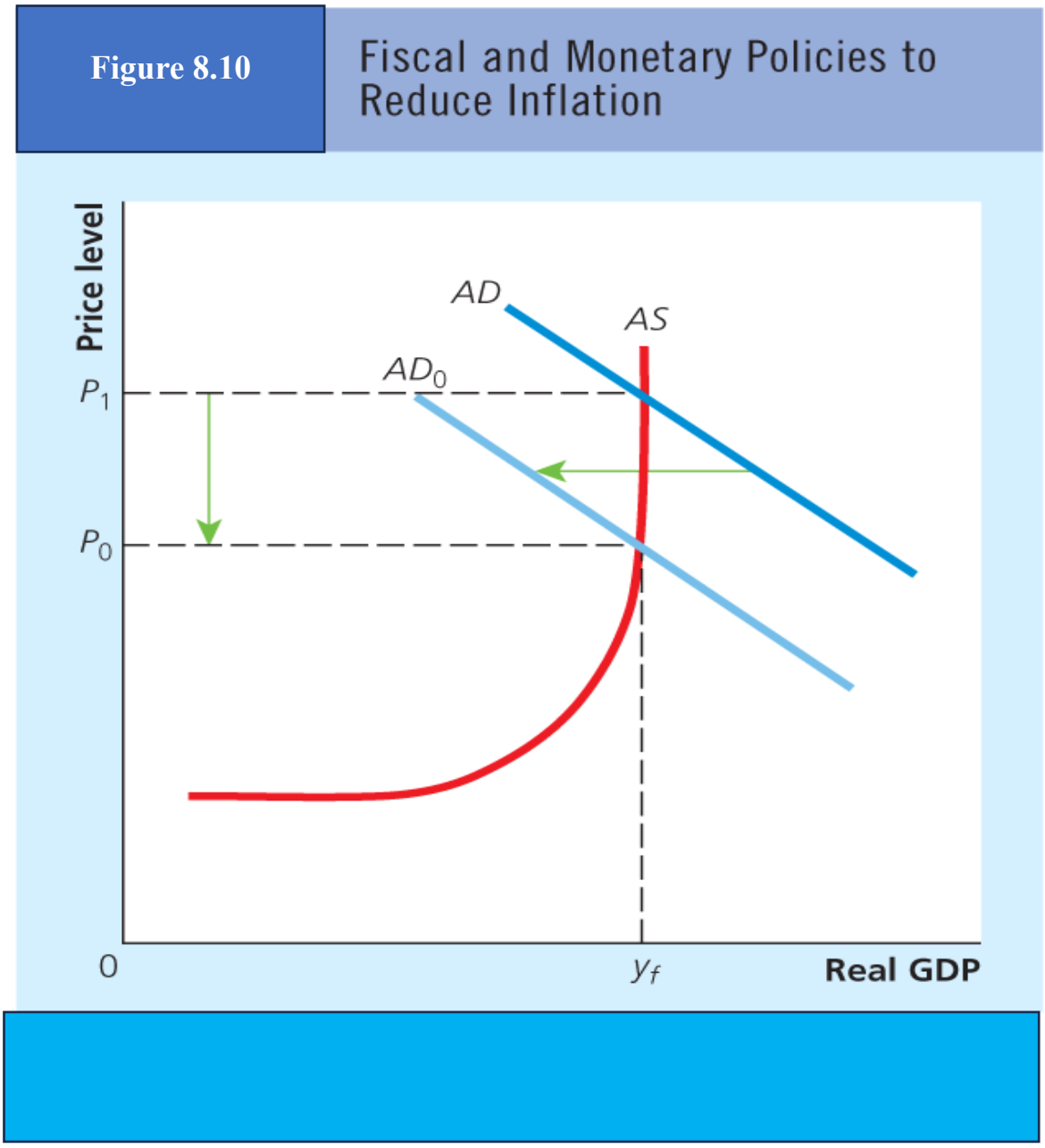
## How Policy Reduces Inflation

In this figure, the initial equilibrium occurs where AD intersects AS. The price level is $P_1$ and output is **at full employment**. To relieve inflationary pressure and lower the price level, the government can shift the AD curve leftward from AD to $AD_0$ using fiscal policy, for example, by cutting government spending, raising taxes, or applying both measures.

The Bank of Canada can achieve a similar result through monetary policy. By raising interest rates, it reduces investment and consumption, which lowers aggregate expenditure. This decrease in AE shifts the AD curve leftward, from AD to $AD_0$. As a result, the price level falls from $P_1$ to $P_0$, while output remains unchanged at **its full-employment level**.

Monetary and fiscal strategies to control inflation and unemployment involve more complexity than shown here. Later chapters provide a more detailed examination of how these policies operate in practice.

**Figure 8.10 Fiscal and Monetary Policies to Reduce Inflation**




## Policies to Reduce Inflation

Just as demand-side policies can shift the AD curve to the right to reduce unemployment, they can also shift it to the left to reduce inflation. Suppose the economy is experiencing high inflation—for example,

the rate of inflation in Canada approached 11% in 1974. This situation resembles an economy operating in the vertical (classical) range of the short-run AS curve, where output is near full capacity.

In this range, increases in aggregate demand raise the price level without expanding real output. To counteract inflation, the government can reduce its own spending or increase taxes to lower aggregate expenditure. The Bank of Canada can raise interest rates, which discourages borrowing and spending by firms and households. These actions shift the AD curve to the left, relieving inflationary pressure while maintaining output near its full-employment level.

## Effects of Changes in Aggregate Supply

**LO 8.10** Analyze the effects of changes in aggregate supply on equilibrium real GDP and price

### Effects of AS Changes on GDP and Prices

Just as a shift in the supply curve of a specific good affects its price and quantity, a shift in the aggregate supply (AS) curve changes the overall price level and real GDP.

**Figure 8.11 The Effect of an Increase in Aggregate Supply**

Aggregate supply shifts in response to supply-side shocks: **crop failures, natural disasters, or changes in production costs.** A rightward shift in the AS curve, caused by **technological progress or productivity gains**, increases output at every price level. Real GDP rises; the price level falls. A leftward shift, caused by cost increases or resource shortages, reduces output and raises the price level.

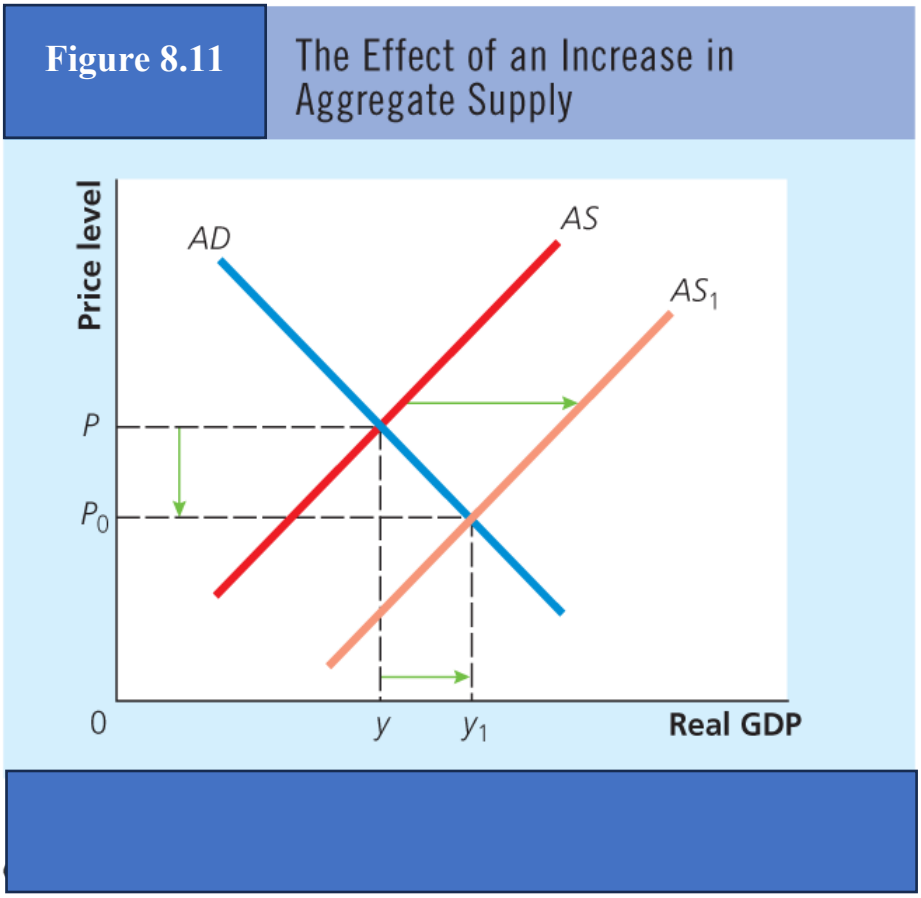
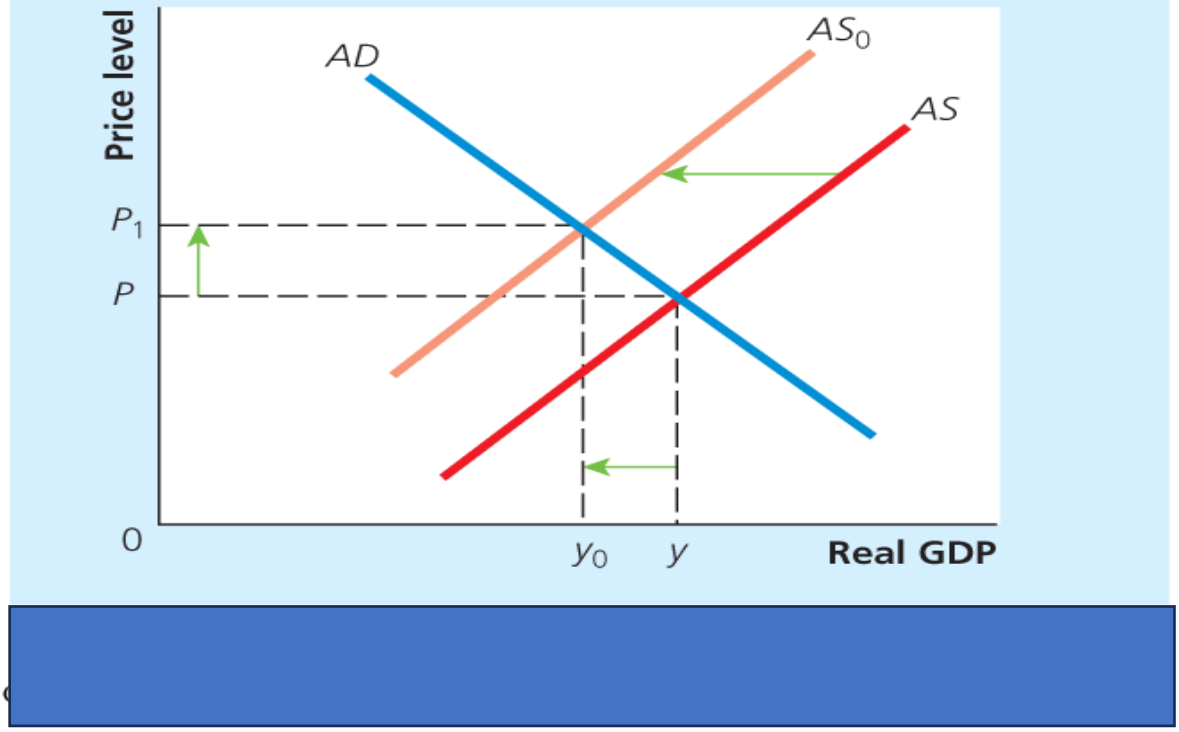



**Figure 8.12 The Effect of a Decrease in Aggregate Supply**

**Figure 8.12** The Effect of a Decrease in Aggregate Supply




## AS Shifts and Equilibrium Outcomes

The equilibrium level of real GDP is y, and the price level is P. An increase in aggregate supply—from AS to $AS_1$—raises real GDP from Y to $Y_1$ and lowers the price level from P to $P_o$.

**An increase in aggregate supply raises real GDP and lowers the price level.**

Now suppose aggregate supply shifts to the left due to a global shortage of a key resource**—for example, oil—which raises production costs. This shift is shown as a movement from AS** to $AS_o$. The result is a rise in the price level from P to $P_1$ and a decline in real GDP from Y to $Y_o$.

**A decrease in aggregate supply lowers real GDP and raises the price level.**

## Supply-Side Policies

**LO 8.11** Discuss the implications of the *AD–AS* model for supply-side policies

### Supply-Side Policies

Supply-side policies aim to influence real GDP and the price level by shifting the aggregate supply (AS) curve. Unlike Keynesian economics, which focuses on managing aggregate demand through expenditure components, supply-side economics emphasizes changes to incentives that affect production, **incentives to work, save, and invest.**

**Supply-side policies** : policies designed to influence real GDP and the price level by shifting the AS curve.

Earlier, we saw that demand-side measures used to reduce inflation—cutting government spending or raising interest rates—can lower prices but may also reduce output and raise unemployment. This trade-off highlights a limitation of demand-side tools.

Supply-side economists propose an alternative: rather than reducing demand to control inflation, increase supply through productivity gains and growth**. Raising output reduces inflationary pressure without sacrificing employment.**

### Reading Comprehension

1. Discuss the effect of an increase in aggregate supply on real output (GDP) and the price level.
2. With the help of a graph, sketch the effects of a decrease in aggregate supply on real output (GDP) and the price level.

A key concept in supply-side thinking is the **marginal tax rate (MTR)**—the change in tax paid from an additional dollar of income. Lower marginal tax rates increase the reward for working and investing, encouraging higher output and shifting the AS curve to the right.

$$MTR = \frac{\Delta T}{\Delta Y}$$

where $T$ represents taxes and $Y$ represents income.

The marginal tax rate is the ratio of the change in taxes to the change in income.

A marginal tax rate of 0.3 means that an increase in income of $100 million will result in an increase in taxes of ($100 $\times$ 0.3) = $30 million.

## How Supply-Side Policies Shift the AS Curve

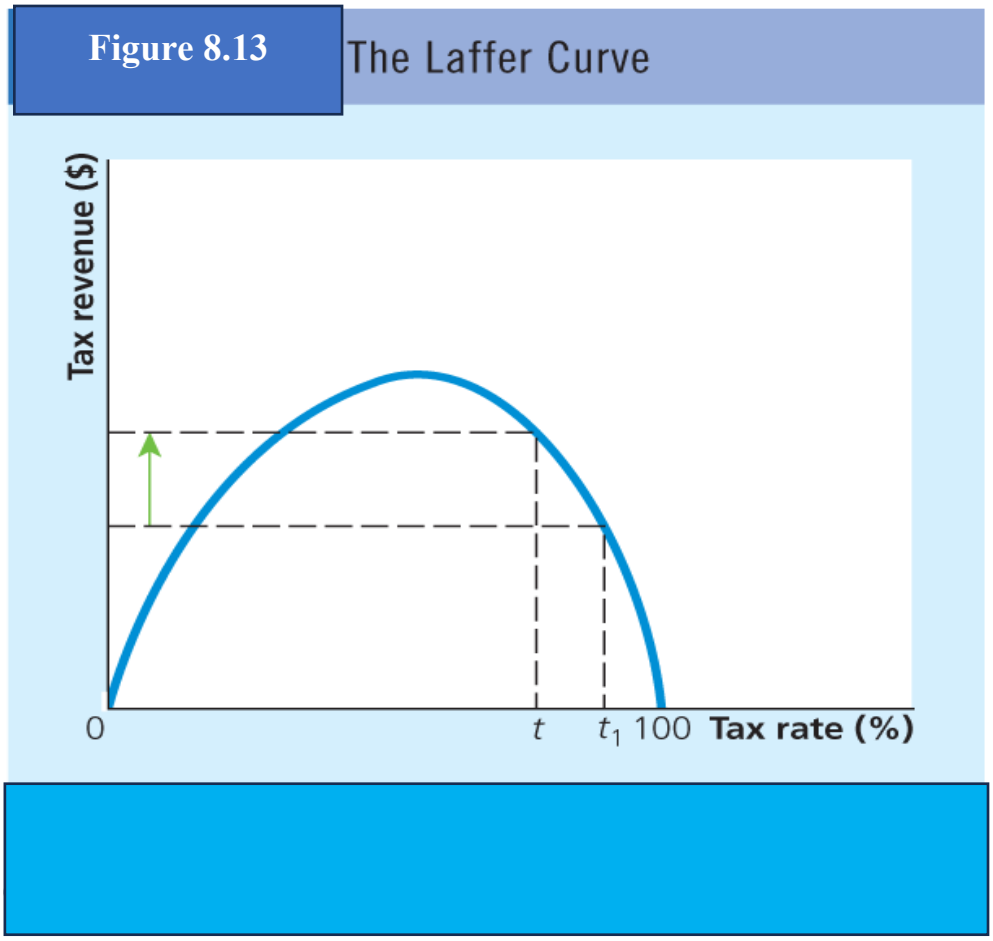
Supporters of supply-side economics focus on policy changes that raise productivity and expand output. These measures shift the aggregate supply (AS) curve to the right.

Tax reforms are central to this approach. Lower marginal tax rates encourage workers to earn more, since additional income is taxed less heavily. Tax cuts that increase household savings expand the pool of funds available for business investment. Greater investment tax credits and lower business taxes create incentives for firms to invest in capital and technology.

In addition, reducing government deficit spending limits the government's claim on resources, making more available for private use. Deregulating industries removes barriers that raise costs or limit output.

According to supply-side economists, these changes improve efficiency, strengthen incentives, and raise productivity, shifting the AS curve to the right and increasing real GDP without raising the price level.

**Figure 8.13 The Laffer Curve**



## How Tax Cuts Work in Supply-Side Policies

Supply-side economists argue that lower tax rates can raise output by improving incentives to work, save, and invest. This idea is illustrated by the **Laffer curve**—a graph showing the relationship between tax rates and total tax revenue.

> ***Laffer curve** : a curve showing the relationship between tax revenues and tax rates.*

As tax rates increase from zero, government revenue also increases. But beyond a certain point, higher tax rates begin to discourage work effort, entrepreneurship, and production. At very high rates, the reward for earning additional income becomes too small to justify the effort, and taxable income shrinks. Revenue then begins to fall.

In Figure 8.13, the tax rate $t_1$ lies beyond this turning point. It is so high that it reduces incentives to work. Cutting the tax rate from $t_1$ to $t$ increases the after-tax return to effort and encourages greater participation in the economy. As a result, output and income rise, and total tax revenue may increase despite the lower rate.

Supply-side policies use this logic to argue that tax cuts can expand the economy and, under certain conditions, generate more revenue—not less—by shifting the aggregate supply curve to the right.

## Critique of the Laffer Curve

The Laffer curve suggests that beyond a certain tax rate, further increases reduce total revenue by discouraging work, saving, and investment. However, empirical evidence—particularly from OECD countries—does not strongly support this hypothesis.

### 1. Weak Empirical Support

Most OECD research finds that labor supply is relatively unresponsive to tax rate changes. The OECD report *Taxation and Economic Performance* concludes that labor supply elasticity is low, especially among primary earners, so moderate tax changes have limited impact on hours worked or total output (https://www.oecd.org/content/dam/oecd/en/publications/reports/1997/01/taxation-and-economic-performance_g17a13cb/668811115745.pdf).

Similarly, a U.S. Congressional Research Service study reviewing data from 1945 to 2010 finds no correlation between top marginal tax rates and economic growth. The report shows that reductions in top rates had little association with saving, investment, or productivity (https://sgp.fas.org/crs/misc/R42111.pdf).

### 2. Non-Monetary Incentives

The Laffer curve assumes monetary incentives are the main drivers of work. But many people work for

other reasons—personal fulfillment, community, or professional reputation. Contributions to open-source platforms like Moodle or R illustrate that people often engage in productive work without financial compensation.

### 3. Inelastic Labor Supply

Empirical studies show that most people do not significantly reduce work hours in response to tax increases. Labor supply, particularly for full-time workers, tends to be inelastic. People continue working even under higher tax burdens, especially when driven by obligations or intrinsic motivation.

The Laffer curve remains a useful theoretical illustration. But as a policy tool, it oversimplifies tax behavior and lacks strong empirical backing, especially in economies where non-monetary motives and institutional stability shape work and investment decisions.

## Effectiveness of Supply-Side Policies

The effectiveness of supply-side policies remains a subject of debate among economists.

### Supporters' Perspective

Proponents argue that measures such as lowering tax rates, deregulating industries, and providing investment incentives enhance productivity and stimulate long-term economic growth. They contend that these policies bolster work incentives, increase savings, and encourage capital formation—factors that collectively shift the aggregate supply curve to the right.

### Critics' Perspective

Critics, however, question the actual impact of supply-side measures on labor supply, savings, and investment. They argue that such policies often disproportionately benefit business owners and high-income earners, with minimal effect on broad-based economic activity.

Notable economists have expressed skepticism:

- **Paul Samuelson (**1915–2009), recipient of the 1970 Nobel Prize in Economics, was a prominent critic of supply-side economics, especially as implemented during the Reagan administration. In his article *Evaluating Reaganomics*, Samuelson highlighted what he saw as deep flaws in supply-side policy, arguing that its leading proponents lacked strong academic grounding and that their economic assumptions were misguided (Samuelson, 1987).

## Reading Comprehension

1. Discuss the basic argument of supply-side economists.
2. How are supply-side policies fundamentally different than demand-side policies?
3. Explain the concept of the *marginal tax rate* (*MTR*).
4. What criticisms have been leveled against supply-side economics?

- **Joseph Stiglitz**, another Nobel laureate, has consistently warned that tax cuts aimed at the wealthy do not lead to increased investment but rather exacerbate income inequality. In his article "How Not to Fight Inflation," Stiglitz argues that such tax cuts fail to stimulate economic growth and instead contribute to greater economic disparities (Stiglitz, 2023).
- **Paul Krugman**, also a Nobel laureate, has labeled supply-side claims as "snake oil," arguing that the promised gains in growth rarely materialize and that the theory primarily serves as a justification for cutting taxes on the wealthy. In his book "Peddling Prosperity," Krugman critically examines the rise of supply-side economics and its impact on economic policy (Krugman, 1994).

### Ongoing Debate

The discourse continues, with economists divided over whether supply-side reforms generate sufficient growth to offset their fiscal and distributional implications.

## Review

1. Review the learning objectives listed at the beginning of the chapter.

2. Have you accomplished all the objectives? One way to determine this is to answer the Reading Comprehension questions at the end of each section. These will help you assess your understanding of the learning objectives.

3. If you have not accomplished an objective, review the relevant material before proceeding.

## Key Points to Remember

1. **LO 8.1** Aggregate demand refers to the various amounts of real output (GDP) that will be demanded at various price levels. The aggregate demand (*AD*) curve slopes downward, indicating that a smaller quantity of output (GDP) will be demanded as the price level rises.

2. **LO 8.2** The shape of the *AD* curve is downward sloping due to the interest rate effect, the foreign trade effect, and the real wealth effect.

3. **LO 8.3** The *AD* curve will *shift* if any component of aggregate expenditure changes. Price level changes will cause a movement *along* the *AD* curve. The four components of aggregate expenditure (*AE*) are consumption, investment, government spending, and net exports.

4. **LO 8.4** Aggregate supply refers to the various quantities of real GDP that will be supplied at various price levels.

5. **LO 8.5** The short-run aggregate supply (*AS*) curve can be defined in terms of three ranges: a horizontal (Keynesian) section, an upward sloping (intermediate section), and a vertical (classical) section.

6. **LO 8.6** The short-run aggregate supply curve will shift in response to supply-side shocks, such as changes in production costs (factor prices), technology, and Mother Nature. The *AS* curve will not shift as a result of changes in the price level.

8. **LO 8.7** The short-run equilibrium level of real GDP and the average level of prices are simultaneously determined by the intersection of the aggregate demand and aggregate supply curves.

8. **LO 8.8** Governments and central banks can use fiscal and monetary policies to shift the *AD* curve in an attempt to reduce unemployment and inflation. The effects of a shift in *AD* will depend on what range of the *AS* curve it intersects.

9. **LO 8.9** Demand-side policies are complex, but they can be effective in combating inflation and unemployment.

10. **LO 8.10** Aggregate supply shocks, such as a shortage of an important input, can cause the short-run aggregate supply curve to shift to the left. Improvements in production technology or improvements in productivity can cause the *AS* curve to shift to the right.

11. **LO 8.11** An increase in short-run aggregate supply can reduce the equilibrium price level and increase equilibrium real GDP. A reduction in short-run aggregate supply can increase the equilibrium price level and reduce equilibrium real GDP. Supply-side economics emphasizes changes in supply as a means of solving inflation and unemployment problems. They encourage tax measures and other means of affecting incentives to work, save, and invest.

# Problems and Exercises

## Basic

1. Table 8.2 contains data on the price level, aggregate quantity demanded, and aggregate quantity supplied for a hypothetical economy.

    a. **LO 8.2, LO 8.7** With the price level on the vertical axis and real GDP on the horizontal axis, draw the aggregate demand (*AD*) and the aggregate supply (*AS*) curves.

    b. **LO 8.7** Determine the equilibrium price level and the equilibrium real GDP.