

# aggregate demand and aggregate supply



## learning objectives

- Introduce the concepts of aggregate demand and aggregate supply.
- Distinguish between short-run and long-run aggregate supply.
- Explain the shapes of aggregate demand and supply curves.
- Discuss the relationship that exists between the aggregate expenditures model and the aggregate demand curve.
- Describe the non-price-level factors that cause the aggregate demand and aggregate supply curves to shift.
- Combine the aggregate demand and aggregate supply curves to provide a model of macroeconomic equilibrium.
- Discuss how the aggregate demand – aggregate supply model may be used to analyse the circumstances outlined in Chapter 5.
- Contrast demand-pull and cost-push inflation.
- Discuss the reasons why the general level of prices is downwards ‘sticky’—the ratchet effect.
- Explain the impact of price-level changes on the size of the multiplier.

## Introduction

Chapters 6 and 7 developed the aggregate expenditures model of the macroeconomy. This model focused on the fluctuations in our real GDP under the assumption that the general level of prices would remain unchanged, thus providing an example of a fixed-price-level model. However, the fixed-price-level assumption ignores the fact that changes in real GDP over the business cycle (Chapter 5) have normally been associated with considerable fluctuations in the price level.

At times there has been an apparent trade-off between the level of output—and employment—and the general price level. Thus periods of near-capacity production and low unemployment have been accompanied by inflation. For example, in the 1980–81 period, unemployment averaged 5.9 per cent, while the CPI rose 9.4 per cent. Conversely, we have encountered periods in which production has slumped—increasing unemployment—but the price level has been relatively stable. For example, during 1992–93 unemployment averaged almost 11 per cent, but the CPI rose by only 1.1 per cent.

At other times—particularly in the 1970s and early 1980s—the trade-off between unemployment and inflation has been absent—high unemployment has coexisted with a rapidly rising price level—stagflation has been the outcome. Thus during 1971–76 inflation increased from 4.5 to 16.8 per cent and unemployment simultaneously rose from 1.4 to 4.6 per cent! Of course, our economy has also enjoyed periods of macroeconomic serenity—the late 1950s saw inflation average 1.9 per cent, and unemployment average 2.5 per cent.

The purpose of this chapter is to develop a variable-price model of the macroeconomy, allowing us to simultaneously analyse changes in real GDP and the price level. We will also explain the links between this model and the aggregate expenditures model of Chapters 6 and 7.

Note that although the aggregate demand and aggregate supply curves will look somewhat like the single-product demand and supply curves from Chapter 3 ‘in large scale’, the variables being measured and the underlying rationales for the curves are *completely* different. Our analysis is now in terms of aggregates—that is, in terms of the economy as a whole. Therefore, the axes of our diagrams will be the overall price level ( $P$ )—reflecting the implicit price deflator (IPD)—and real GDP ( $Q$ ), rather than the price of product  $X$  and units of product  $X$ .

## Aggregate demand

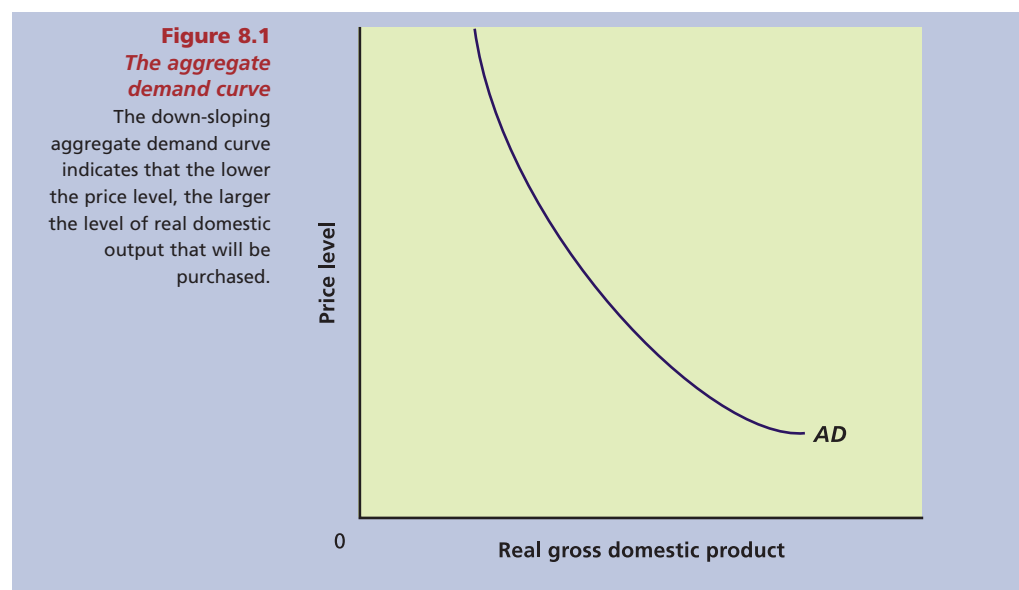
**Aggregate demand curve:** represents the amount of goods and services—real GDP—that will be purchased at each possible price level.

### Aggregate demand curve

The **aggregate demand curve** shows the amount of goods and services—real domestic output—that domestic consumers, businesses, the government and foreign buyers will collectively want to purchase at each possible price level. Other things being equal, the lower the average level of

prices, the larger will be the level of real domestic output purchased. Conversely, the higher the average level of prices, the lower will be the level of real domestic output purchased. Thus the relationship between the price level and real GDP is inverse or negative.

As shown in Figure 8.1, the aggregate demand curve slopes downwards and to the right. Why is this so? Curiously, the rationale is not the same as that which applies to the demand for a single product, which is based on income and substitution effects. These explanations break down when we are dealing in terms of aggregates. In Figure 8.1 *all* prices are falling (on average) as we move down the aggregate demand curve, so the rationale for the substitution effect (a product becoming cheaper relative to all other products) is not applicable. Similarly, an individual's demand curve for a specific product assumes the consumer's income to be fixed, but the aggregate demand curve implies varying aggregate incomes.



The reason for varying aggregate incomes is that as we move up the aggregate demand curve, we move to higher price levels. But, higher prices paid for goods and services flow to resource suppliers as higher wage, rent, interest and profit incomes. To oversimplify, a 5 per cent increase in the price level increases money incomes by 5 per cent. As a result, an increase in the price level need not necessarily mean a decline in the real purchasing power of the economy. If that enlarged income is spent, the same real domestic output could be purchased. However, as we are about to discuss, other factors will lead to a fall in the total level of real incomes and output in the economy as the price level rises.

The three major factors that provide the rationale for a down-sloping aggregate demand curve are the interest-rate effect, the real-balances effect and the foreign-purchases effect.

### Interest-rate effect

**Interest-rate effect:**  
as the price level rises, so do nominal interest rates; rising interest rates cause reductions in certain kinds of consumption and, most importantly, investment spending.

The **interest-rate effect** suggests that the rationale for the down-sloping aggregate demand curve lies in the impact of the changing price level on interest rates and, in turn, on consumption and investment spending. More specifically, as the price level rises so do interest rates; rising interest rates in turn cause reductions in certain kinds of consumption and investment spending.

Here is an elaboration: when the price level increases, consumers need to have more money on hand for making purchases, and businesses similarly require more money to meet their payrolls and purchase other needed inputs. In short, a higher price level increases the demand

for money. If the supply curve for money is up-sloping, this increase in demand drives up the price paid for the use of money. That price, of course, is the interest rate.

Alternatively, we might focus on the impact of increases in the price level on the real returns paid to investors and other groups who provide funds to businesses and consumers for investment expenditure and the purchase of consumer durables. Higher prices reduce the purchasing power of the money these groups receive from the loans or investments they have made. Additionally, higher prices reduce the purchasing power of the streams of interest incomes—in the form of interest payments—that they receive. How will these individuals protect themselves from this erosion to their returns? By increasing the interest rates they charge for funds. Higher interest rates ensue. These ideas will be pursued in greater detail in Chapter 12, which deals with monetary policy.

Higher interest rates will curtail certain interest-sensitive expenditures by businesses and households. A firm that expects a 10 per cent return on a potential capital goods purchase will find this purchase profitable when the interest rate is only 7 per cent. But when the interest rate has risen to 12 per cent, the purchase becomes unprofitable and will therefore not be made. Similarly, an increase in the interest rate makes some consumers decide not to purchase houses or other consumer durables. To summarise, a higher interest rate curtails certain interest-sensitive business and consumer expenditures.

Our conclusion is that a higher price level, by leading to increases in interest rates, causes a reduction in the amount of real output demanded.

### Real-balances effect

**Real-balances effect:** at a higher price level the real value or purchasing power of the accumulated financial assets held by the public falls; the fall in real wealth of the public leads to a reduction in consumption expenditures. (Also referred to as the wealth effect.)

A second reason why the aggregate demand curve is down-sloping involves the wealth effect, or **real-balances effect**. The idea here is that at a higher price level the real value or purchasing power of the accumulated financial assets held by the public—particularly assets with fixed money values such as savings accounts or bonds—diminishes. Because of the erosion of the real value of such assets, the public is now poorer in real terms and can therefore be expected to reduce spending. A household might feel comfortable about buying a new car or a boat if the real value of its financial asset balances is, say, \$50 000. But if inflation causes the real value of these asset balances to decline to, say, \$30 000, the family may decide to defer its purchase. Conversely, a decline in the price level increases the real value of the household's wealth and tends to increase spending.

### Foreign-purchases effect

**Foreign-purchases effect:** a rise in our domestic price level increases our imports and reduces our exports, thereby reducing net exports.

We found, in the discussion of national income accounting in Chapter 4, that imports and exports are important components of aggregate demand. For present purposes, the point to be noted is that the volumes of our imports and exports depend, among other things, on the relative price levels here and abroad. Therefore, if our price level rises relative to foreign countries, Australian buyers will purchase more imports at the expense of Australian goods. Similarly, foreigners will also buy fewer Australian goods, causing our exports to decline. In short, other things being equal, a rise in our domestic price level increases our imports and reduces our exports, thereby reducing the net exports component of aggregate demand in Australia. Conversely, a relative decline in our price level reduces our imports and increases our exports, thereby increasing the net exports component of Australian aggregate demand. The impact on aggregate demand of these changes is referred to as the **foreign-purchases effect**.

## Deriving the aggregate demand curve from the aggregate expenditures model<sup>1</sup>

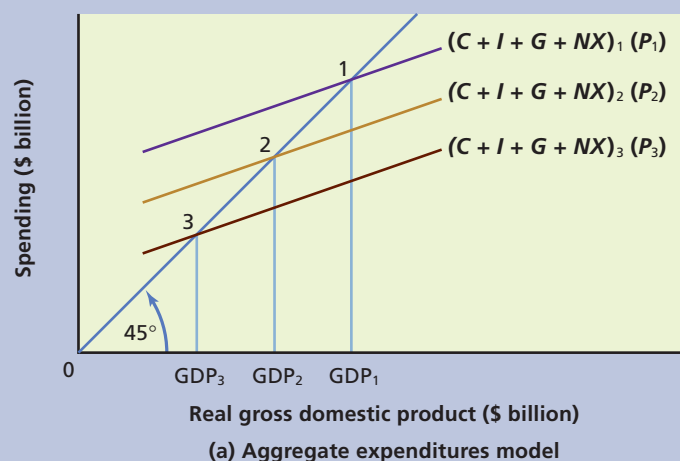
We can reconcile the aggregate expenditures model developed in Chapters 6 and 7, which shows the relationship between aggregate expenditures and real GDP, with our aggregate demand curve that shows an inverse relationship between real GDP and the price level.

The aggregate expenditures model assumes that an increase/decrease in aggregate expenditures brings about an increase/decrease in total output at the existing or 'going' price level. The aggregate demand curve, by definition, merely relates the various possible price levels to the corresponding equilibrium real GDPs. Consider Figure 8.2. Note, to begin with, that we can stack our aggregate expenditures model of Figure 8.2(a) and the aggregate demand curve of Figure 8.2(b) vertically because real domestic output is being measured on the horizontal axis of both models. Now we can start in the top diagram with an aggregate expenditures schedule that yields  $(C + I + G + NX)_2$ . The price level relevant to this aggregate expenditures schedule is  $P_2$  as shown in parentheses. From this information we can plot the equilibrium real domestic output,  $GDP_2$ , and the corresponding price level of  $P_2$ . This gives us one point—that is, 2'—on the aggregate demand curve of Figure 8.2(b).

**Figure 8.2**  
**Deriving the**  
**aggregate demand**  
**curve from the**  
**expenditures–output**  
**model**

Through the interest-rate effect, the wealth or real-balances effect and the foreign-purchases effect, the investment, consumption and net export schedules—and therefore the aggregate expenditures schedule—will rise/fall when the price level declines/increases.

If the aggregate expenditures schedule is at  $(C + I + G + NX)_2$  when the price level is  $P_2$ , we can combine that price level and the equilibrium output,  $GDP_2$ , to determine one point, 2', on the aggregate demand curve. A lower price level such as  $P_1$  shifts aggregate expenditures to  $(C + I + G + NX)_1$ , providing us with point 1' on the aggregate demand curve. Similarly, a higher price level at  $P_3$  shifts aggregate expenditures down to  $(C + I + G + NX)_3$  so  $P_3$  and  $GDP_3$  yield another point on the aggregate demand curve at 3'.



We can now go through the same procedure but assume that the price level is lower at  $P_1$ . We know that, other things being equal, a lower price level will:

- reduce the interest rate, increasing investment expenditures
- increase the real value of wealth, boosting consumption expenditures
- reduce imports and increase exports, raising net export expenditures.

Thus the aggregate expenditures schedule rises from  $(C + I + G + NX)_2$  to, say,  $(C + I + G + NX)_1$ , giving us equilibrium at  $GDP_1$ . In Figure 8.2(b) we locate this new combination of the price level and real domestic output,  $P_1$  and  $GDP_1$ , at point 1'.

Similarly, let us now suppose the price level increases from the original  $P_2$  level to  $P_3$ . The interest rate rises, while the real value of wealth falls, and reduced competitiveness lowers net export expenditures. The investment, net export and consumption schedules fall, shifting the aggregate expenditures schedule downwards from  $(C + I + G + NX)_2$  to  $(C + I + G + NX)_3$ , where real output is  $GDP_3$ . This permits us to locate a third point on the aggregate demand curve of Figure 8.2(b), namely point 3', where the price level is  $P_3$  and real output is  $GDP_3$ .

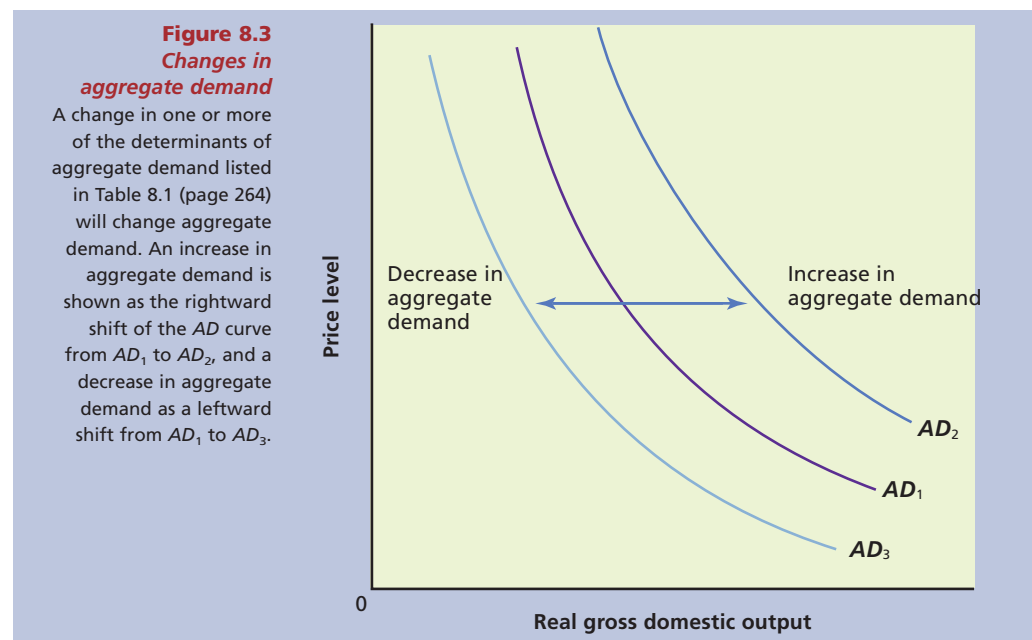
To summarise, a decrease/increase in the price level shifts the aggregate expenditures schedule upwards/downwards and thereby increases/decreases the equilibrium real GDP. The resulting combinations of the price level and real GDP yield various points such as 1', 2' and 3', which locate a given down-sloping aggregate demand curve.

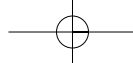
## Determinants of aggregate demand

Thus far we have found that changes in the price level cause changes in the level of spending by domestic consumers, businesses, government and foreign buyers in such a way that we can predict changes in the amount of real domestic output; that is, an increase in the price level, other things being equal, decreases the quantity of real domestic output demanded. Conversely, a decrease in the price level increases the amount of real output desired. This relationship is represented graphically as point-to-point movements along a stable aggregate demand curve. However, if one or more of those 'other things' change, the entire aggregate demand curve shifts position. We refer to these 'other things' as **determinants of aggregate demand**; they 'determine' the location of the aggregate demand curve.

To understand what causes changes in domestic output, we must distinguish between changes in the quantity of real output demanded that are caused by changes in the price level and changes in aggregate demand that are caused by changes in one or more of the determinants of aggregate demand. You will recall that we drew a similar distinction when discussing single-product demand curves in Chapter 3.

As shown in Figure 8.3, an increase in aggregate demand is depicted by the rightward movement of the curve from  $AD_1$  to  $AD_2$ . This shift indicates that, at each price level, the





desired amount of real goods and services is larger than before. Alternatively, a decrease in aggregate demand is shown as the leftward shift of the curve from  $AD_1$  to  $AD_3$ . This shift tells us that people desire to buy less real output at each price level than previously.

To repeat, the changes in aggregate demand shown in the figure occur when there are changes in one or more of the factors previously assumed to be constant. These determinants of aggregate demand are listed in Table 8.1. Let us examine each element of the table in the order shown.

**Table 8.1**

Determinants of aggregate demand: factors that shift the aggregate demand curve

- 1. Changes in consumer spending**
  - (a) Consumer wealth
  - (b) Consumer expectations
  - (c) Consumer indebtedness
  - (d) Taxes
- 2. Changes in investment spending**
  - (a) Interest rates
  - (b) Profit expectations on investment projects
  - (c) Business taxes
  - (d) Technology
  - (e) Degree of excess capacity
- 3. Changes in government spending**
- 4. Changes in net export spending**
  - (a) Foreign GDP growth
  - (b) The level of the exchange rate

## Consumer spending

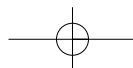
Independently of changes in the price level, domestic consumers may collectively alter their purchases of Australian-produced real output. When this happens, the entire aggregate demand curve shifts. It shifts leftwards, as from  $AD_1$  to  $AD_3$  in Figure 8.3, when consumers buy less output than before at each possible price level; it moves rightwards, as from  $AD_1$  to  $AD_2$ , when they buy more at each possible price level.

Changes in one or more of several non-price-level factors may change consumer spending and therefore shift the aggregate demand curve. As indicated in Table 8.1, these factors are real consumer wealth, consumer expectations, consumer indebtedness and taxes.

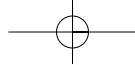
### Consumer wealth

Consumer wealth means all the assets owned by consumers, including financial assets such as stocks and bonds and physical assets such as houses and land. A sharp decline in the real value of consumer assets encourages people to save more (buy fewer products) to restore their wealth. The resulting decline in consumer spending decreases aggregate demand—that is, shifts the aggregate demand curve leftwards. Conversely, an increase in the real value of consumer wealth increases consumption spending at each price level; the aggregate demand curve will shift rightwards.

An important warning—we are *not* referring here to the previously discussed wealth effect, or real-balances effect, which assumes a fixed aggregate demand curve and results from a change in the price level; it is a non-price-level factor that shifts the entire aggregate demand curve. An example would be a sharp increase in stock prices that increases consumer wealth, even though the price level has not changed. Similarly, a sharp decline in the real value of houses and land reduces consumer wealth independently of changes in the general price level.







### Consumer expectations

Changes in consumer expectations about the future usually change consumer spending. When people expect their future real income to rise, they spend more of their current income. Present consumption spending increases (present saving falls), and the aggregate demand curve shifts rightwards. Conversely, an expectation that real income will decline in the future reduces present consumption spending and, therefore, aggregate demand.

Similarly, a widely held expectation of surging future inflation increases aggregate demand today, because consumers buy products before prices escalate. Conversely, expectation of lower price levels in the near future may reduce present consumption, in that people postpone some of their present consumption to take advantage of the future lower prices.

### Consumer indebtedness

Consumers with high levels of indebtedness from past buying sprees financed by credit may be forced to cut present spending to pay off existing consumer debt. The result is a decline in consumption spending and a leftward shift of the aggregate demand curve. Conversely, when consumers' indebtedness is relatively low, their present consumption spending increases. This produces an increase in aggregate demand.

### Taxes

A reduction in personal income tax rates increases take-home income and increases consumer purchases at each possible price level; that is, tax cuts shift the aggregate demand curve rightwards. Tax increases, on the other hand, reduce consumption spending and shift the aggregate demand curve leftwards.

## Investment spending

Investment spending—the purchase of capital goods—is a second determinant of aggregate demand. A decline in the amount of new capital goods desired by businesses at each price level shifts the aggregate demand curve leftwards. Conversely, an increase in the desired amount of investment goods increases aggregate demand. Let us consider the factors that can alter the level of investment spending as listed in Table 8.1.

### Interest rates

All else being equal, an increase in the interest rate caused by a factor other than a change in the price level lowers investment spending and reduces aggregate demand. We are not referring here to the so-called interest-rate effect occurring as a result of a change in the price level. Instead, we are referring to a change in the interest rate resulting from, say, a change in the nation's monetary policy. A tightening of monetary policy increases the interest rate and reduces investment.

### Profit expectations on investment projects

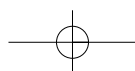
Improved profit expectations on investment projects increase the demand for capital goods and shift the aggregate demand curve rightwards. For example, an anticipated rise in spending by consumers may, in turn, improve the profit expectations of possible investment projects. Alternatively, if the profit outlook on possible investment projects dims because of an expected decline in consumer spending, investment spending also declines.

### Business taxes

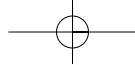
An increase in business taxes reduces after-tax profits from corporate investment and reduces investment spending and aggregate demand. Conversely, tax reductions increase after-tax profits from corporate investment, increase investment spending and push the aggregate demand curve rightwards.

### Technology

New and improved technologies stimulate investment spending and increase aggregate demand. For example, recent advances in the high-tech fields of microbiology and electronics have spawned new laboratories and production facilities to exploit the new technologies.







### Degree of excess capacity

A rise in excess capacity—unused existing capital—retards the demand for new capital goods and reduces aggregate demand. Firms operating factories at well below capacity have little incentive to build new factories. Alternatively, when firms collectively discover that their excess capacity is dwindling, they build new factories and buy more equipment. Hence, investment spending rises and the aggregate demand curve shifts to the right.

### Government spending

Government's desire to buy goods and services is a third determinant of aggregate demand. An increase in government purchases of domestic output at each price level increases aggregate demand as long as tax collections and interest rates do not change so as to reduce other categories of expenditure equally. An example of expansionary government spending would be a decision to revitalise the nation's railway system. Conversely, a reduction in government spending, such as a reduction in government funding of universities, reduces aggregate demand.

### Net export spending

The final determinant of aggregate demand is net export spending (net exports). When foreign consumers change their purchases of Australian goods and services independently of changes in our price level, the Australian aggregate demand curve shifts as well. We again specify 'independent of changes in our price level' to distinguish clearly from changes in spending associated with the foreign-purchases effect. Increases in net exports (exports minus imports), caused by factors other than changes in the Australian price level, push our aggregate demand curve rightwards. Increases in the level of exports constitute increased foreign demand for Australian goods and services, and a reduction in the level of imports implies an increased domestic demand for Australian products.

The non-price-level factors that alter net exports are mainly the level of foreign GDP growth and the level of the exchange rate.

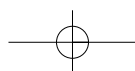
#### Foreign GDP growth

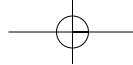
Rising incomes in countries that are Australia's trading partners increase aggregate demand in Australia. As the income levels rise in Australia's trading partners, their citizens can afford to buy more products made both in their home country and in Australia. Our exports will therefore rise in step with increases in the national incomes of our trading partners. Declines in national income abroad have the opposite effect; our net exports decline, shifting the aggregate demand curve leftwards.

#### Exchange rates

A change in the exchange rate between the Australian dollar and other currencies is a second factor affecting net exports and, hence, aggregate demand. If the Australian dollar price of yen rises, this would mean a depreciation of the Australian dollar against the yen. Viewed differently, if the yen price of an Australian dollar falls, this means the yen appreciates against the Australian dollar. The new relative values of Australian dollars and yen mean consumers in Japan can obtain more Australian dollars with any given number of yen. Similarly, consumers in Australia will obtain fewer yen for each of their dollars.

As a result, Japanese consumers will discover that Australian goods and services are cheaper in terms of yen. Australian consumers will find, meanwhile, that fewer Japanese products can be purchased with a given number of their dollars. With respect to our exports, a \$90 Australian-made jumper might now be bought for 8100 yen compared to 9450 yen previously. In terms of our imports, a Japanese car might now cost \$16 330 instead of \$14 000. In these circumstances, our exports will rise and imports will fall. This increase in net exports translates into an increase in Australian aggregate demand. Think through the opposite scenario in which the Australian dollar appreciates (the yen depreciates).





## Aggregate demand shifts and aggregate expenditures<sup>2</sup>

We know that changes in the determinants of aggregate demand in Table 8.1 represent changes in the aggregate expenditures that underlie our aggregate expenditures–income model of Chapters 6 and 7. What happens if we hold the price level constant and consider shifts in aggregate expenditures caused by changes in these non-price-level determinants of consumption, investment and net exports? The answer is that the entire aggregate demand curve shifts rightwards or leftwards.

Consider Figure 8.4 (page 268). We begin with the aggregate expenditures schedule at  $(C + I + G + NX)_1$  in Figure 8.4(a), yielding a real domestic output of  $GDP_1$ . Assume now that technological improvements or more optimistic business expectations cause the investment schedule to shift upwards so that the aggregate expenditures schedule rises from  $(C + I + G + NX)_1$  to  $(C + I + G + NX)_2$ . ( $P_1$  in parentheses remind us that the price level is assumed to be constant.) The result, we know, will be a multiplied final increase in real GDP from  $GDP_1$  to  $GDP_2$ . In Figure 8.4(b) this is reflected in a total increase in aggregate demand from  $AD_1$  to  $AD_2$ , showing the *same* multiplied increase in real GDP from  $GDP_1$  to  $GDP_2$ . Note that the change in real GDP depicted in Figure 8.4(b) is associated with the constant price level  $P_1$  because we are in the horizontal range of the simple aggregate supply curve presented in Chapter 5. We will discuss the implications of changes in the price level for the multiplier shortly and introduce a more realistic model of aggregate supply in the next section of this chapter.

Clearly, the multiplier process defines the total size of the shift of the aggregate demand curve in the aggregate demand–aggregate supply model just as it defines the size of the final change in aggregate expenditures and income in the aggregate expenditures model (see Figure 8.4). In terms of the aggregate demand–aggregate supply model, this may be reinterpreted as follows: an initial change in one of the non-price-level determinants of demand (Table 8.1) leads to a multiplied final change in aggregate demand at all possible price levels. Thus, if the multiplier is 4, an initial increase of \$5 billion in planned investment expenditure, resulting in a \$5 billion initial rightward shift of the aggregate demand curve, results in a total rightward shift of the aggregate demand curve by \$20 billion. In general:

$$\text{shift in AD curve} = \text{initial change in spending} \times \text{multiplier}$$

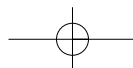
### Policy insight



#### Information in inventory changes

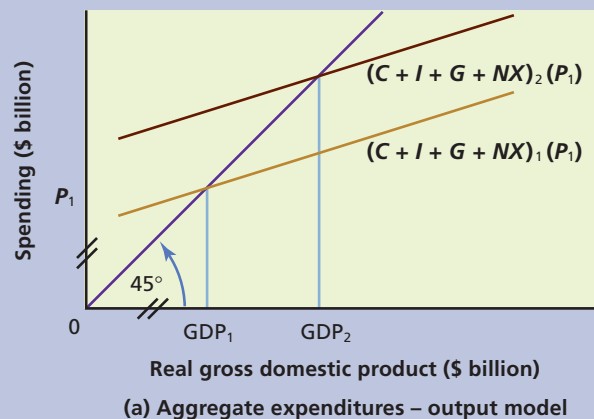
Economists have traditionally used a variety of measures as indicators of the level of economic activity. One of these is the level of inventories held by business. As we know from our models, a slowing of economic growth is associated with an increase in inventory levels, and an increase in the pace of economic growth is associated with a falling of inventory levels. So says traditional theory.

What happens, however, as technology starts to have a greater impact on inventory management? What are the implications of the trend towards a service-based and knowledge-based economy? A move towards just-in-time (JIT) inventory management tends to reduce the size of inventories held by businesses that adopt JIT practices, regardless of the level of economic activity. Service-based and knowledge-based businesses may, in general, require less physical inventory to operate than conventional businesses do. The implications? That inventory levels may become a less relevant indicator of economy-wide changes in the rate of economic growth. They will still, however, provide a useful indicator of the state of the manufacturing sector.

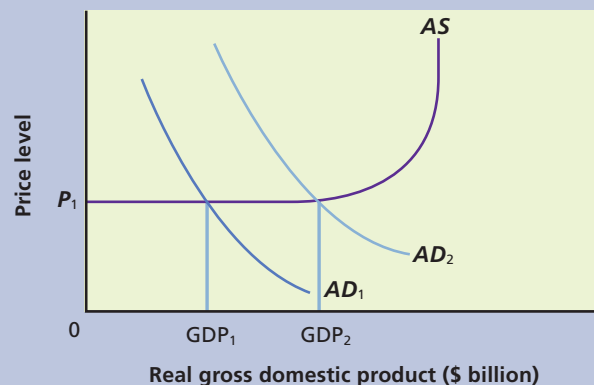


**Figure 8.4**  
*Shifts in the aggregate expenditures schedule and in the aggregate demand curve*

In (a) we assume that some determinant of consumption or investment other than the price level shifts the aggregate expenditures schedule from  $(C + I + G + NX)_1$  to  $(C + I + G + NX)_2$ , thereby increasing real domestic output from  $GDP_1$  to  $GDP_2$ . In (b) we find that the aggregate demand counterpart of this is a rightward shift of the aggregate demand curve from  $AD_1$  to  $AD_2$ , which is just sufficient to show the same increase in real output as in the expenditures–output model.



(a) Aggregate expenditures – output model



(b) Aggregate demand – aggregate supply model

- The aggregate demand curve shows the level of real domestic output that will be purchased at each possible price level. The rationale for the down-sloping aggregate demand curve is based on the interest-rate effect, the real-balances effect and the foreign-purchases effect.
- The interest-rate effect indicates that a higher price level results in increased interest rates due to either an up-sloping money supply curve or higher rates being charged by lenders of funds and investors to compensate for the erosion of their purchasing power. Increased interest rates reduce consumption and investment purchases that are interest-rate sensitive.
- The real-balances effect indicates that inflation reduces the real value or purchasing power of fixed-value financial assets held by households and causes them to cut back on their consumer spending.
- The foreign-purchases effect suggests that an increase/decrease in Australia's price level relative to other countries reduces/increases the net exports component of aggregate demand.
- The down-sloping aggregate demand curve can be derived from the expenditures–output model by varying the price level and determining how the consequent shifts in aggregate expenditures alter the equilibrium level of real domestic output.
- Shifts in the aggregate demand curve are associated with shifts in the aggregate expenditures curve caused by changes in the non-price-level determinants of consumption, investment and net exports.
- The determinants of aggregate demand are spending by domestic consumers, businesses, government and foreign buyers.
- Changes in the factors listed in Table 8.1 cause changes in spending by these groups and shift the aggregate demand curve.

**CHECKPOINT**

## PART 2

# Aggregate supply

**Aggregate supply curve:** indicates the level of real domestic output that will be produced at each possible price level.

The **aggregate supply curve** indicates the level of real domestic output that will be produced at each possible price level. Higher price levels create an incentive for enterprises to produce and sell additional products, and lower price levels are associated with a reduction in output. As a result, the relationship between the price level and real GDP is generally seen to be direct or positive. In fact, in Chapter 5 and earlier in this chapter, we presented an aggregate supply curve that, while generally up-sloping and consistent with these ideas, embodied three quite distinct segments or ranges: the horizontal; the intermediate; and the vertical ranges. The shape of this aggregate supply curve reflected what happens to production costs as the domestic output expands or contracts.

However, this simple model is not completely consistent with some of the observed features of our macroeconomy. You may recall the discussions of the natural rate of unemployment and potential output in Chapter 5. These concepts suggest that at any point in time, there are long-run constraints on the amount of output that we may consistently produce without generating an inflationary gap. However, these concepts are also rather flexible. Thus, in the short run we may be able to exceed the economy's 'potential'—think in terms of sustainable—level of output and income.

In short, the simplified aggregate supply curve (with its horizontal range, intermediate range, and vertical range) needs to be refined. We must distinguish between short-run and long-run aggregate supply, if we are to adequately model the behaviour of our economy. We will continue this discussion in Chapters 14 and 15.

## Definitions: short run and long run

As used here, the *short run* is a period in which input prices—particularly nominal wages—remain fixed in the presence of a change in the price level. There are two basic reasons why input prices may remain constant for a time even though the price level has changed:

- Workers may not immediately be aware of the existence of a higher or lower price level. If so, they will not know that their real wages have changed and will not adjust their wage demands accordingly.
- Many employees are hired under conditions of fixed-wage contracts. Unionised workers, for example, receive nominal wages based on the terms of their awards. Other workers have their nominal wages established under enterprise agreements. Additionally, most managers and many professionals receive set salaries established through contracts.

The result of the lack of information about the price level and the existence of awards and set salaries is that changes in the price level normally do not immediately change nominal wages.

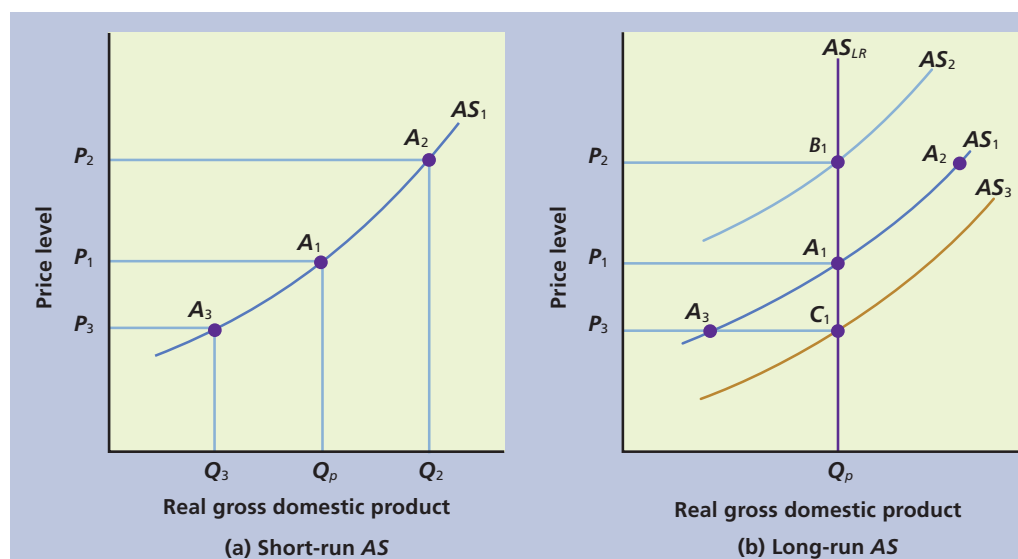
The *long run* is a period in which input prices, particularly wages and salaries, are fully responsive to changes in the price level. Given sufficient time, workers can gain full information about price-level changes and consequently ascertain the effects on their real wage. Workers will be aware that a price-level increase has reduced their real wage and that a price-level decline has increased their real wage. More importantly, workers and employers in the long run are freed from their existing labour contracts and can negotiate changes in nominal wages and salaries.

## Short-run aggregate supply

Consider the **short-run aggregate supply curve** shown as  $AS_1$  in Figure 8.5(a) (page 270). This curve is constructed on the basis of two assumptions:

- The initial price level is  $P_1$ .
- Nominal wages have been established on the expectation that the price level  $P_1$  will persist.

You will observe from point  $A_1$ , and from the vertical and horizontal lines that meet at it, that the economy is operating at its potential level of output  $Q_p$  and at price level  $P_1$ . This potential real output is the real production forthcoming when the economy is operating at its natural rate of unemployment.



**Figure 8.5 Short-run and long-run aggregate supply**

(a) In the short run, input prices such as nominal wages are assumed to be fixed and are based on price level  $P_1$ . An increase in the price level will improve profits and entice firms to expand real output. Alternatively, a decrease in the price level will reduce profits and real output. The short-run AS curve ( $AS_1$ ) therefore slopes upwards. (b) In the long run, a price-level rise will increase nominal wages and thus shift the short-run AS curve leftwards from  $AS_1$  to  $AS_2$ . Conversely, a decrease in the price level will reduce nominal wages and shift the short-run AS curve rightwards from  $AS_1$  to  $AS_3$ . The long-run AS curve ( $AS_{LR}$ ) may therefore be thought of as being vertical.

Now let us determine the consequence of changes in the price level by initially examining an increase in the price level from  $P_1$  to  $P_2$ . Because nominal wages are fixed in the short run, the higher product prices associated with  $P_2$  will enhance profits. In response, producers will increase their output from  $Q_p$  to  $Q_2$ , as indicated by the move from  $A_1$  to  $A_2$  on  $AS_1$ . You will observe that at  $Q_2$  the economy is operating above its potential output level. This is made possible by extending work hours for part-time and full-time employees, enticing new workers such as homemakers and retirees into the labour force, and hiring and training the structurally unemployed. Thus the nation's unemployment rate will fall below its natural rate of unemployment.

How will producers respond when there is a decrease in the price level from  $P_1$  to  $P_3$ ? Firms will discover their profits have diminished or disappeared. After all, product prices have dropped, but nominal wages have not. Producers will therefore reduce employment and production and, as revealed by point  $A_3$ , real output will fall to  $Q_3$ . This decline in real output will be associated with an unemployment rate greater than the natural rate.

## Long-run aggregate supply

By definition, nominal wages are assumed to be fully flexible in the long run in response to changes in the price level. What are the implications of this assumption for aggregate supply?

See Figure 8.5(b), and again assume that the economy is initially at point  $A_1$  ( $P_1$  and  $Q_p$ ). Our previous discussion indicated that an increase in the price level from  $P_1$  to  $P_2$  will move the economy from point  $A_1$  to  $A_2$  along the short-run aggregate supply curve  $AS_1$ . In the long



run, workers will discover that their real wages have fallen as a result of this increase in the price level. They will therefore, presumably, respond by demanding higher nominal wages to restore their previous level of real wages. The short-run aggregate supply curve will shift leftwards from  $AS_1$  to  $AS_2$  and now reflect the higher price level  $P_2$  and the expectation that  $P_2$  will continue. Figure 8.5(b) shows that the leftward shift in the short-run aggregate supply curve to  $AS_2$  will move the economy from  $A_2$  to  $B_1$ . Real output will fall to its potential level and the unemployment rate will return to its natural rate.

Conversely, a decrease in the price level from  $P_1$  to  $P_3$  in Figure 8.5(b) will produce the opposite scenario. As previously noted, the economy will initially move from point  $A_1$  to point  $A_3$ , at which profits will be squeezed or eliminated because prices have fallen and nominal wages have not. But this is simply the short-run response. Given enough time, the lower price level  $P_3$  (which has increased the real wage), together with the higher unemployment associated with the reduction in real output, will diminish nominal wages. We know that sufficiently lower nominal wages will shift the short-run aggregate supply curve rightwards from  $AS_1$  to  $AS_3$  and real output will return to  $Q_p$  at point  $C_1$ .

When we trace a line between the long-run equilibrium points  $B_1$ ,  $A_1$  and  $C_1$ , a **long-run aggregate supply curve** appears. Observe that it is vertical at the level of potential output  $Q_p$ —a level of output consistent with the economy's natural rate of unemployment.

## Determinants of aggregate supply

Our discussion of the short-run and long-run aggregate supply curves revealed that real domestic output increases in the short run as the economy moves from left to right up the short-run aggregate supply curve. In the long run, however, we cannot exceed the economy's potential output level.

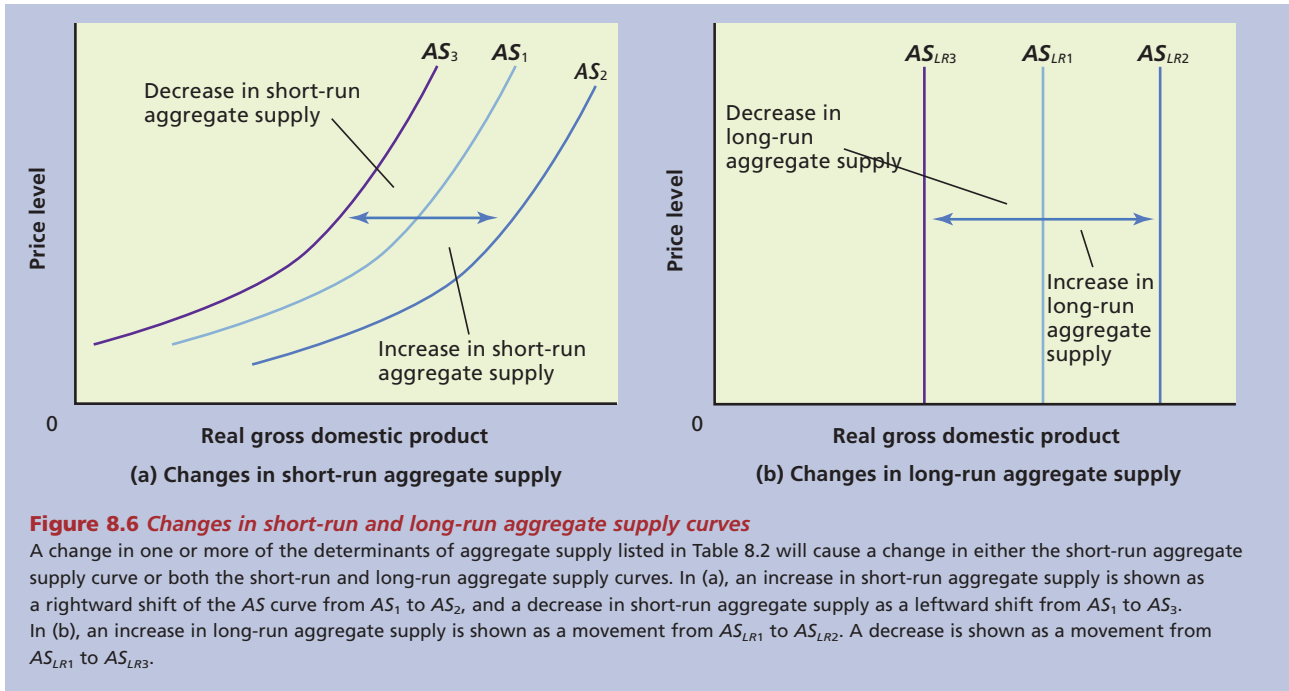
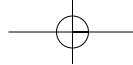
Changes in output that result from movements along the short-run aggregate supply curve must be distinguished from shifts in the short-run aggregate supply curve itself. Changes in output that reflect changes in the long-run aggregate supply curve's position must also be identified. An existing short-run or long-run aggregate supply curve identifies the relationship between the price level and real domestic output, other things being equal. But when one or more of these 'other things' change, these aggregate supply curves may themselves shift.

The shift of the short-run aggregate supply curve from  $AS_1$  to  $AS_2$  in Figure 8.6(a) (page 272) shows an increase in short-run aggregate supply. This shift is rightwards, indicating that businesses collectively will produce more real output at each price level than previously. For convenience, we will refer to an increase in short-run or long-run aggregate supply as a 'rightward' shift of the curve rather than a 'rightward or downward' shift. Conversely, the shift of the short-run aggregate supply curve from  $AS_1$  to  $AS_3$  will be referred to as a 'leftward shift', indicating a decrease in aggregate supply; that is, businesses will now produce less real output at each price level than before (or charge higher prices at each level of output).

In a similar fashion, we can show increases in long-run aggregate supply as rightward shifts in the long-run aggregate supply curve. This is illustrated in Figure 8.6(b) by a move in the long-run aggregate supply curve from  $AS_{LR1}$  to  $AS_{LR2}$ . Similarly, we can observe decreases in long-run aggregate supply as leftward shifts in the long-run aggregate supply curve from  $AS_{LR1}$  to  $AS_{LR3}$ .

Table 8.2 (page 272) summarises the 'other things' that shift the aggregate supply curve when they change. These factors are called **determinants of aggregate supply** because they collectively 'determine' or establish the location of the aggregate supply curves. These determinants have one thing in common—when they change, per-unit production costs also change, shifting the short-run aggregate supply curve. In some cases, the potential output level of the economy also changes, resulting in shifts in the long-run aggregate supply curve.

The point is that there are factors other than changes in real domestic output that alter per-unit production costs and which may alter the potential for the economy to produce (see Table 8.2). When one or more factors change, per-unit production costs change at each



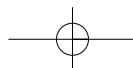
**Table 8.2**

Determinants of aggregate supply: factors that shift the aggregate supply curves

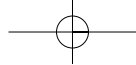
Change in factor	Impacts on short-run (SR) or long-run (LR) aggregate supply
<b>1. Changes in input prices</b> (a) Domestic resource availability – land – labour – capital – entrepreneurial ability (b) Prices of imported resources (c) Market power	SR and LR
<b>2. Changes in productivity</b>	SR (possibly LR) SR (possibly LR)
<b>3. Changes in the legal and institutional environment</b>	SR and LR
(a) Business taxes and subsidies (b) Government regulation	SR and LR

price level and the short-run aggregate supply curve shifts positions. Specifically, decreases in per-unit production costs of this type shift the short-run aggregate supply curve rightwards. Conversely, increases in per-unit production costs shift the short-run aggregate supply curve leftwards. When per-unit production costs change for reasons other than a change in domestic output, firms collectively alter the amount of domestic output they produce at each price level.

We will now examine how changes in the aggregate supply shifters listed in Table 8.2 affect per-unit production costs and thereby shift the aggregate supply curve.







## Input prices

Input or resource prices—to be distinguished from the output prices comprising the price level—are an important determinant of aggregate supply. All else being equal, higher input prices increase per-unit production costs and therefore reduce aggregate supply. Lower input prices produce just the opposite result. The following factors influence input prices: domestic resource availability, the prices of imported resources, and market power.

### Domestic resource availability

We noted in Chapter 2 that a society's production possibility curve shifts outwards when the resources available to it increase. Rightward shifts in the production possibilities curve translate into rightward shifts of our long-run aggregate supply curve. Increases in the supply of domestic resources lower input prices and, as a result, per-unit production costs fall, and the short-run aggregate supply curve moves rightwards. Thus, at any given price level, firms collectively produce and offer for sale more real domestic output than before. Conversely, declines in resource supplies increase input prices and reduce the economy's ability to produce output, shifting the economy's short-run and long-run aggregate supply curves to the left.

How could changes in the availability of land, labour, capital, and entrepreneurial resources work to shift the aggregate supply curve? Several examples will help answer this question.

#### *Land*

More land resources could become available through discoveries of mineral deposits, irrigation of land, or technological innovations that permit us to transform what were previously 'non-resources' into valuable factors of production. An increase in the supply of land resources will lower the price of land inputs and thus lower per-unit production costs. For example, the relatively recent discovery that widely available materials at low temperatures can act as superconductors of electricity is expected eventually to reduce per-unit production costs by reducing electricity loss during transmission. This lower price of electricity will increase both short-run and long-run aggregate supply.

Two examples of reductions in land resources availability may also be cited: the widespread loss of agricultural land through salinity; and the nation's loss of topsoil through intensive farming. Eventually, each of these problems may increase input prices and shift the long-run and short-run aggregate supply curves leftwards.

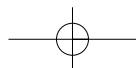
#### *Labour*

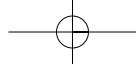
Around 70 per cent of all business costs are wages or salaries. All else being equal, changes in wages thus have a significant impact on per-unit production costs and on the location of the aggregate supply curve. An increase in the availability of labour resources reduces the price of labour; a decrease raises labour's price. Shifts in the supply of labour also affect the potential output of society. For example, the immigration of employable workers from abroad has historically increased the availability of labour in Australia. Conversely, the great loss of life during World War I greatly diminished the post-war availability of labour in Australia, tending to raise per-unit production costs and reduce the potential output level.

#### *Capital*

Long-run and short-run aggregate supply tends to increase when society adds to its stock of capital. Such an addition would happen if society saved more of its income and directed the savings towards the purchase of capital goods. In much the same way, an improvement in the quality of capital reduces production costs and increases short-run and long-run aggregate supply. For example, businesses have over the years replaced poor-quality equipment with new, superior equipment.

Conversely, short-run and long-run aggregate supply declines when the quantity and quality of the nation's stock of capital diminish. For example, in the depths of the Great Depression of the 1930s, our capital stock deteriorated because new purchases of capital were insufficient to offset the normal wearing out and obsolescence of plant and equipment.





### *Entrepreneurial ability*

Finally, the amount of entrepreneurial ability available to the economy can change from one period to the next and shift the aggregate supply curve. For example, media publicity about individuals who have amassed fortunes through entrepreneurial efforts might conceivably increase the number of people who have entrepreneurial aspirations, tending to shift the aggregate supply curves rightwards.

### **Prices of imported resources**

Just as foreign demand for Australian goods and services contributes to our aggregate demand, the importation of resources from abroad adds to our aggregate supply. Resources add to our productive capacity, whether they are domestic or imported. Imported resources reduce input prices and therefore decrease the per-unit cost of producing Australian real domestic output. Generally, a decrease in the prices of imported resources expands our short-run aggregate supply, and an increase in the prices of these resources reduces our short-run aggregate supply. Inasmuch as these resources are not available locally, shifts in their prices and availability may affect the long-run supply curve in a similar fashion.

Exchange rate fluctuations are a factor that periodically alter the price of imported resources, especially capital goods. Suppose the Australian dollar price of foreign currency falls—that is, the dollar appreciates—enabling Australian firms to obtain more foreign currency with each Australian dollar. This means that Australian producers face a lower dollar price of imported resources. Under these conditions, Australian firms would expand their imports of foreign resources and realise reductions in per-unit production costs at each level of output. Falling per-unit production costs of this type shift the Australian short-run aggregate supply curve to the right.

Conversely, an increase in the Australian dollar price of foreign currency—a depreciation—raises the prices of imported resources. As a result, our imports of these resources fall, our per-unit production costs jump upwards, and our short-run aggregate supply curve moves leftwards.

### **Market power**

A change in the degree of market power held by sellers of resources can also affect input prices and short-run aggregate supply. Market power is the ability to set a price above that which would occur in a competitive situation. The rise and fall of OPEC's market power during the past two decades is a good illustration. The tenfold increase in the price of oil that OPEC achieved during the 1970s permeated our economy, drove up per-unit production costs, and jolted the Australian aggregate supply curve leftwards. Conversely, a substantial reduction in OPEC's market power during the mid-1980s reduced the cost of manufacturing and transporting products and, as a direct result, increased Australian aggregate supply.

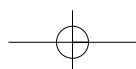
A change in the use of union market power may also be expected to affect the location of the aggregate supply curve. Some observers believe that unions exploited their market power in the 1970s to achieve large increases in award pay rates. These higher pay rates may well have increased per-unit production costs and produced leftward shifts of short-run aggregate supply. Alternatively, unions used their market power to control wage increases throughout much of the 1980s. Union power fell dramatically throughout the 1990s. Consequently, there may have been an increase in short-run aggregate supply during these two decades. If union practices restrict the productivity and availability of labour rather than just the price, this will affect the position of the long-run supply curve.

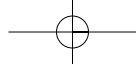
**Productivity:**  
the relationship  
between real output  
and the quantity of  
inputs used to produce  
it, often measured as  
average real output per  
unit of input.

### **Productivity**

**Productivity** relates a nation's level of real output to the quantity of input used to produce that output. In other words, productivity is a measure of average output, or of real output, per unit of input:

$$\text{productivity} = \frac{\text{real output}}{\text{input}}$$





An increase in productivity means that more real domestic output can be obtained from the amount of resources—or inputs—currently available.

How does an increase in productivity affect the aggregate supply curves? We first need to discover how a change in productivity alters per-unit production costs. Suppose real domestic output in a hypothetical economy is 10 units, the input quantity needed to produce that quantity is 5, and the price of each input unit is \$2. Productivity—output per input—is 2 ( $= 10/5$ ). The per-unit cost of output would be found through the following formula:

$$\text{per-unit production cost} = \frac{\text{total input cost}}{\text{units of output}}$$

In this case, per-unit cost is \$1, found by dividing \$10 of input cost ( $= \$2 \times 5$  units of input) by 10 units of output.

Now, suppose that real domestic output doubles to 20 units, while the input price and quantity remain constant at \$2 and 5 units; that is, suppose productivity rises from 2 ( $= 10/5$ ) to 4 ( $= 20/5$ ). Because the total cost of the inputs stays at \$10 ( $= \$2 \times 5$  units of input), the per-unit cost of the output falls from \$1 to \$0.50 ( $= \$10 \text{ of input} / 20 \text{ units of output}$ ).

By reducing per-unit production costs, an increase in productivity shifts the short-run aggregate supply curve rightwards; conversely, a decline in productivity increases per-unit production costs and shifts the short-run aggregate supply curve leftwards.

In terms of the long-run aggregate supply curve, an increase in productivity means that we can get more output from our available supply of resources. The result: a rightwards shift of the long-run aggregate supply curve.

We will discover in Chapter 16 that productivity growth is a major factor in explaining the secular expansion of aggregate supply in Australia and the corresponding growth of real domestic output. The use of more machinery and equipment per worker, improved production technology, a more highly educated and trained labour force, and improved forms of business enterprises have interacted to raise productivity, all else being equal, and increase long-run aggregate supply.

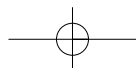
## Policy insight



### Inflation and business profitability

Businesses need to recognise that operating in a low-inflation environment requires different business strategies from those required in a high-inflation economy. The reasons? A high-inflation environment allows businesses to easily pass on increases in costs that arise from wage and input price increases. Indeed, the recognition of this ability may actually lead to companies negotiating these increases a little more easily. If all prices are increasing fairly rapidly, the impact of your actions on company profitability will be quickly offset by price rises in the rest of the economy. Additionally, there is often money to be made through rapidly rising asset prices. Businesses may, therefore, be distracted from their core activities because of the temptation to purchase assets for speculative capital gain.

In a low-inflation situation, many of the above possibilities are lost. Competitors' prices may not be rising rapidly. Customers will more easily identify when your prices are increasing relative to those of your competitors. Speculation on existing assets may not be profitable because of the more limited potential for capital gains. The results? Greater care must be taken when agreeing to increases in input prices. It may not be possible to pass on these increases to customers. In other words, business profits will need to be generated from core business activities, not sidelines. Those businesses that understand what they do best will have the best chances of success.



## Legal and institutional environment

Changes in the legal and institutional setting in which businesses collectively operate may alter per-unit costs of output and shift the aggregate supply curves. Two categories of changes of this type are:

- changes in taxes and subsidies
- changes in the extent of regulation.

### Business taxes and subsidies

Higher business taxes, such as excise and payroll taxes, increase per-unit costs and reduce short-run aggregate supply in much the same way as a wage increase does. For example, an increase in the payroll taxes paid by businesses increases production costs and reduces aggregate supply. Similarly, a business subsidy—a payment or tax break by government to firms—reduces production costs and increases aggregate supply.

### Government regulation

It is usually costly for businesses to comply with government regulations. Hence, regulation increases per-unit production costs and shifts the short-run aggregate supply curve leftwards. ‘Supply-side’ proponents of deregulation of the economy have argued forcefully that, by increasing efficiency and reducing paperwork associated with complex regulations, deregulation will reduce per-unit costs. In this way, the short-run aggregate supply curve will supposedly shift rightwards. Conversely, increases in regulation raise production costs and reduce short-run aggregate supply.

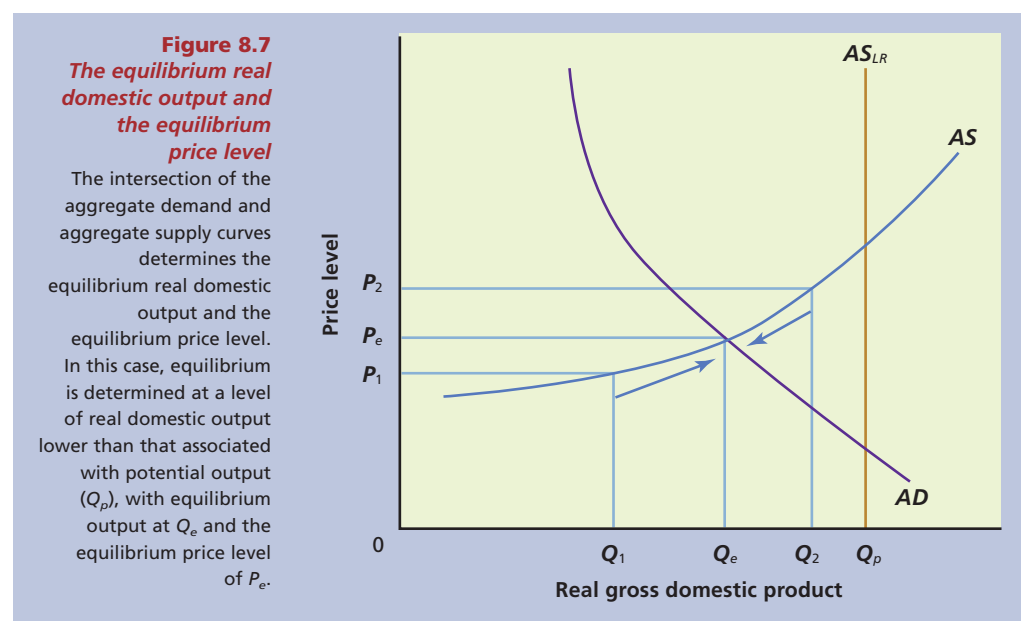
However, the impact of extensive regulation falls not just on the cost of supply, but also on the ability to produce. Meeting regulatory requirements requires the use of resources and diverts these away from the production of alternative goods and services. Thus the long-run aggregate supply curve may be shifted to the left by increases in the resources required to conduct business in general. Of course, this potential loss to production must be traded off against any benefits derived from regulation.

- The short-run aggregate supply curve shows the levels of real domestic output that will be produced at various possible price levels. In the short run, where nominal wages are fixed, an increase in the price level increases profits and real output. Conversely, a decrease in the price level reduces profits and real output. Thus the short-run aggregate supply curve is upward-sloping.
- The long-run aggregate supply curve shows us that we cannot consistently exceed the potential output level of the economy—that which coincides with the natural rate of unemployment. In the long run, where nominal wages are variable, increases in the price level raise nominal wages and shift the short-run aggregate supply curve leftwards. Conversely, declines in the price level shift the short-run aggregate supply curve rightwards. The long-run aggregate supply curve is therefore vertical at the potential level of output.
- As indicated in Table 8.2, the determinants of aggregate supply are input prices, productivity, and the legal and institutional environment.
- All else being equal, a change in one of these factors changes per-unit production costs at each level of output and therefore alters the location of the short-run aggregate supply curve.
- Changes in the determinants of aggregate supply that alter the productive potential of the economy shift the long-run aggregate supply curve.

## CHECKPOINT

## Equilibrium: real output and the price level

We found in Chapter 3 that the intersection of the demand for and the supply of a particular product would determine the equilibrium price and equilibrium output of that good. Similarly, as we see in Figure 8.7, the intersection of the aggregate demand and aggregate supply curves determines the **equilibrium real domestic output** and the **equilibrium price level**. In this case, the point of intersection lies to the left of the long-run aggregate supply curve and potential output ( $Q_p$ ) and the equilibrium real domestic output and price level are  $Q_e$  and  $P_e$  respectively. If the business sector had decided to produce a larger domestic output such as  $Q_2$ , it would be unable to dispose of that output; that is, aggregate demand would be insufficient to take that domestic output off the market. Faced with unwanted inventories of goods and falling profits, businesses would reduce prices and cut back on output to the equilibrium level, as indicated by the leftward-pointing arrow.



Conversely, if businesses had only produced domestic output  $Q_1$ , they would find that their inventories of goods would quickly diminish and their profits rise because sales of output would exceed production. Businesses would react by increasing production and prices, and domestic output would rise to equilibrium, as shown by the rightward-pointing arrow.

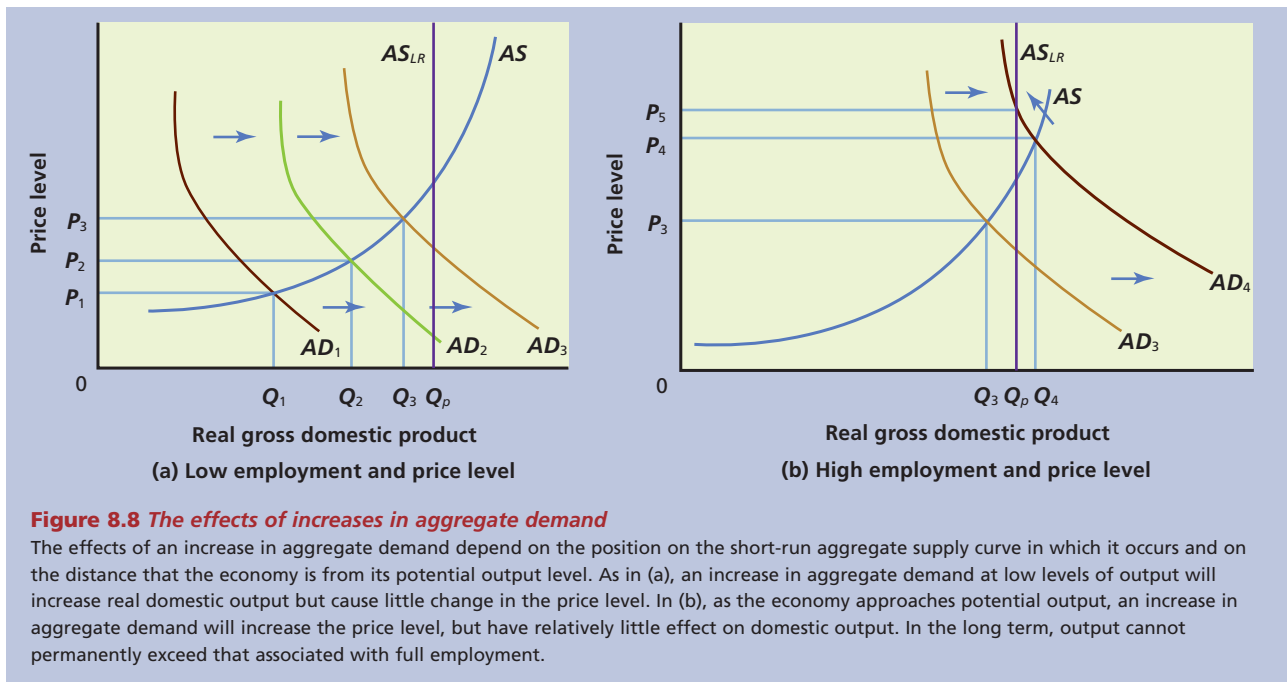
The next obvious step in our analysis is to shift the aggregate demand and aggregate supply curves and observe the effects on real output—and therefore employment—and on the price level. During our discussion, we will discuss the impact of changes in some of the determinants of aggregate demand and aggregate supply on the equilibrium values of real domestic output and the price level.

### Shifting aggregate demand

Suppose that households and businesses decide to increase their spending; that is, they choose to purchase a larger real output at each possible price level, so shifting the aggregate demand curve to the right. Our list of determinants of aggregate demand (see Table 8.1) provides several possible reasons for this decision. Perhaps people become more optimistic in their expectations about future economic conditions. Households now feel more secure with respect to future

employment and so they decide to consume more (and therefore save less) of their current incomes. Similarly, businesses anticipate that future business conditions will be more prosperous and therefore increase their investments in capital goods to enlarge their productive capacities. As shown in Figure 8.8, the precise effects of an increase in aggregate demand depend on where the economy is currently on the short-run aggregate supply curve, and where it is relative to the potential level of output.

Consider positions where the levels of output are relatively distant from potential output, such as  $Q_1$  in Figure 8.8(a). Here, there is a high level of unemployment and much idle productive capacity. The effect of an increase in aggregate demand ( $AD_1$  to  $AD_2$ ) is to bring about a large increase in real domestic output ( $Q_1$  to  $Q_2$ ) and employment with relatively little increase in the price level ( $P_1$  to  $P_2$ ).



**Figure 8.8** The effects of increases in aggregate demand

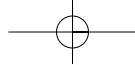
The effects of an increase in aggregate demand depend on the position on the short-run aggregate supply curve in which it occurs and on the distance that the economy is from its potential output level. As in (a), an increase in aggregate demand at low levels of output will increase real domestic output but cause little change in the price level. In (b), as the economy approaches potential output, an increase in aggregate demand will increase the price level, but have relatively little effect on domestic output. In the long term, output cannot permanently exceed that associated with full employment.

Why is this the case? Because the economy is in a severe recession or depression, large amounts of idle machinery and equipment and unemployed workers are available. These idle resources, both human and property, can be put back to work with little upward pressure on the price level. As domestic output expands over this range, no significant shortages or production bottlenecks will be incurred to cause prices to rise. Because producers can acquire labour and other inputs at fairly stable prices, production costs will not rise significantly as output is expanded, reducing the level of increase in product prices.

As aggregate demand increases further ( $AD_2$  to  $AD_3$ ) we will approach potential output ( $Q_p$ ) in Figure 8.8(a), producing an output level  $Q_3$ . Here labour and capital are nearly fully employed. An increase in aggregate demand ( $AD_2$  to  $AD_3$ ) will have a relatively lower impact in raising real domestic output ( $Q_2$  to  $Q_3$ ) and a relatively larger impact on the price level ( $P_2$  to  $P_3$ ).

Why is this so? The basic reason is that the aggregate economy in fact comprises innumerable product and resource markets, and the full-employment level of output is not reached evenly or simultaneously in the various sectors or industries. Hence, as the economy expands in the  $Q_2Q_3$  real output range, the high-tech computer industry may encounter shortages of skilled workers while the car or steel industries are still faced with substantial





unemployment. Similarly, in certain industries raw material shortages or similar production bottlenecks may begin to appear. Expansion also means that some firms will be forced to use older and less efficient machinery as they approach capacity production. Less capable workers may be hired as output expands. For all of these kinds of reasons, production costs rise at a more rapid rate, and firms must increase product prices more rapidly for production to be profitable.

Finally, consider Figure 8.8(b), which illustrates the impact of an increase in aggregate demand ( $AD_3$  to  $AD_4$ ) as we approach potential output. The increase in aggregate demand will have a relatively small impact on real domestic output ( $Q_3$  to  $Q_4$ ) and a relatively large impact on the price level ( $P_3$  to  $P_4$ ). Note that in the short run we may exceed potential output, as shown in Figure 8.8(b). In the long run we will tend to move to a higher short-run aggregate supply curve and return to the economy's potential output level ( $Q_p$ ).

How, you may ask, may we exceed the economy's level of potential output? Surely at the economy's full-employment output level, individual firms may try to expand production, but will succeed only by bidding resources away from other firms. The resources and additional production that one firm gains will be lost by some other firm. Resource prices (costs) and, ultimately, product prices will rise as a result of this process, but real domestic output will remain unchanged.

A distinct point must be made in connection with the concept of potential output. This is that 'full employment' and 'potential output' are slippery concepts. This is true not merely because the full-employment rate of unemployment—the natural rate of unemployment—is difficult to quantify (see Chapter 5), but also because the hours of work and the size of the labour force can sometimes be expanded beyond what is normal. In a highly prosperous economy, daily working hours and the working week can be extended. Workers can also engage in moonlighting, the practice of holding more than one job. For example, during World War II a 10-hour working day and a 6-day working week were not uncommon. Many workers, after completing their normal working day, would work a partial or full night shift in a defence plant. Many of these workers, who would not ordinarily have worked, joined the labour force in response to patriotic appeals and high wages. But for our purposes it is acceptable to say there is some specific level of real output that corresponds to full employment.

Price-level increases that occur as aggregate demand increases while aggregate supply is fixed constitute **demand-pull inflation**. Shifts in aggregate demand are pulling up the price level; the stable short-run aggregate supply curve suggests that most wage costs have not changed.

**Demand-pull inflation:**  
inflation associated  
purely with shifts in  
aggregate demand,  
resulting from changes in  
the components of  
aggregate expenditures,  
along a stable short-run  
aggregate supply curve.

## The ratchet effect

What if decreases in aggregate demand? Our model predicts that as aggregate demand falls, real GDP will fall and so will the price level. But there is an important complicating factor that raises serious doubts about the predicted effects of declines in aggregate demand on prices. The reverse movements of aggregate demand—from  $AD_4$  to  $AD_3$  in Figure 8.8(b) and from  $AD_3$  to  $AD_2$  or from  $AD_2$  to  $AD_1$  in Figure 8.8(a)—may not restore the initial equilibrium positions, at least in the short term. The complication is that prices of both products and resources tend to be 'sticky', or inflexible in a downward direction. What goes up in economics need not come down, at least not down to its original level. Hence, economists talk of a **ratchet effect**, a ratchet being a mechanism that permits us to crank a wheel forwards but not backwards.

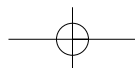
## Causes

What might cause downward price inflexibility? The reasons for downward price inflexibility are complex.

### Wages

An assumption of our short-run aggregate supply curve is that wages are fixed over the short-term period of analysis. Because wages, which typically constitute 70 per cent or more of a firm's total costs, are inflexible downwards, it may be extremely difficult for firms to reduce their

**Ratchet effect:**  
the result of the  
tendency for prices of  
both products and  
resources to be  
individually 'sticky' or  
inflexible in a downward  
direction, leading to a  
loss in downward  
flexibility of the general  
level of prices.





prices and remain profitable. Additionally, as higher output levels are attained, companies tend to hire more workers. Bonuses will have been promised. Each of these factors will have tended to lock in a greater wage cost than previously existed.

### Employers' interests

Wage inflexibility is reinforced by the fact that employers may not want to reduce employment levels in the face of a temporary decline in demand. The reasons are at least twofold. On the one hand, redundancies may well have an adverse impact on worker morale and hence on labour productivity (output per worker). Although lower employment levels would tend to lower labour cost per unit of output, lower worker productivity obviously tends to increase unit labour costs.

Most employers have made an 'investment' in the training and experience of their present labour forces and in their acquisition. Were they to initiate a round of voluntary redundancies in the face of a decline in aggregate demand, they could expect to lose workers more or less randomly; both some highly trained workers and some relatively unskilled workers could be expected to quit. To the extent that the highly trained workers find jobs with other firms, the present employer would forgo any chance of getting a return on the investment made in their

## Asia in focus



### Investment and growth

Investment spending is often seen as the basis for economic growth, both now and into the future.

Investment to GDP (or GNP) ratios vary widely across the region, as do the growth rates of its economies.

Country	Gross domestic investment, 2000 (% of GDP)	Growth in GDP 1999–2000 (%)
Australia	24	1.9
China, mainland	37	7.9
China, Hong Kong SAR	28	10.5
India	24	3.9
Indonesia	18	4.8
Japan	26	2.4
Malaysia	26	8.3
New Zealand	21	2.5
Singapore	31	9.9
Thailand	23	4.3
Vietnam	27	5.5
World	22	3.9

SOURCE: World Bank, 2002 *World Development Indicators*.

### Questions

- 1 Graph the growth rate of GNP against the investment to GDP ratio for each of the countries in the table.
- 2 Does there appear to be a positive relationship between the investment to GDP ratio and the rate of economic growth? What is the possible source of this relationship?
- 3 Which countries have exceptionally large investment to GDP ratios? Discuss the factors that may help to explain the size of this ratio in each of these countries.

training. A better option might be to maintain workers on the basis of seniority. Generally, the less senior workers laid off will be the less skilled workers, in whom the employer's training investment is least. However, this does not always ensure that the most productive workers are maintained.

### Monopoly power

Another part of the explanation of the downward stickiness of prices stems from the fact that in many industries firms have sufficient monopolistic power to resist price cuts when demand declines. Such firms may instead accept large cuts in production and employment as an alternative to price reductions.

### Menu costs

Price changes are often costly to implement. Customers must be notified of changes, computer systems need their records adapted, new brochures may be required, and so on. The costs of implementing price changes—menu costs—discourage firms from changing prices in the short run. Thus we expect price changes to be less frequent, and the costs of implementing these changes traded off against the profits forgone because of sales lost over the period.

The implication of downward price inflexibility is significant. We may effectively move to a higher short-run aggregate supply curve than that previously operated on, even in the absence of the re-negotiation of wage contracts.

## Shifting aggregate supply

The supply decisions of businesses are made on the basis of costs. Businesses are profit seekers, and economic profits are the difference between product prices and unit production costs. It follows that anything that increases production costs will necessitate a higher price level to induce the business sector to produce any given level of real domestic output; that is, higher production costs shift the aggregate supply curve leftwards (upwards), as from  $AS_1$  to  $AS_3$  in Figure 8.6(a). Conversely, declines in production costs would shift the short-run aggregate supply curve rightwards (downwards), as from  $AS_1$  to  $AS_2$  in Figure 8.6(a).

### Causes

What could cause costs to increase? A number of factors are suggested by our determinants of aggregate supply (see Table 8.2). Perhaps foreign suppliers might impose dramatic increases in the prices of our imported equipment. As higher prices permeate the economy, the costs of producing virtually every product will rise. Alternatively, government might start a comprehensive program to protect the environment and thus levy special taxes on polluters to make them bear the spillover costs they have been imposing on society. These additional taxes raise costs and move the short-run aggregate supply curve to the left.

Conversely, the discovery of new and cheaper energy supplies might reduce the cost of any real output level, and tend to shift the short-run aggregate supply rightwards. Similarly, lower taxes and lower interest rates mean lower costs and a rightward shift of the short-run aggregate supply curve.

You will observe that a shift in aggregate supply curve may well involve a change in the potential level of real domestic output; that is, the vertical range shifts to the left or right. You will recall from Chapter 2 that increases in resource supplies and technological advances both tend to increase the maximum real output the economy is capable of producing. Examples of increases in resource supplies are increases in the supplies of labour through domestic population growth or immigration, and increases in the stock of capital through investment. The discovery of new and cheaper energy supplies provides a further example. This realisation of economic growth that was portrayed as a rightward shift of the production possibilities curve in Chapter 2 is reflected in the rightward shift of the long-run aggregate supply curve in our present analysis, as shown in Figure 8.6(b).

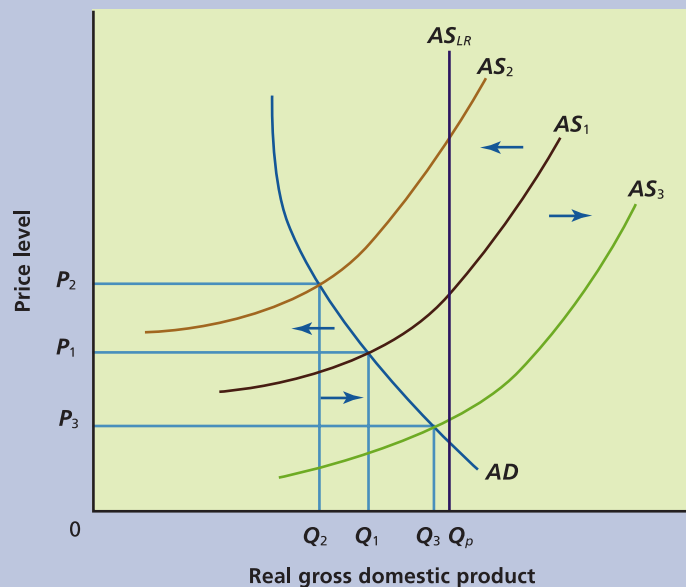
## Effects

Let us now shift our attention from causes to the effects of shifts in the short-run aggregate supply curve. Note that, given aggregate demand, the effects of a leftward shift in short-run aggregate supply are doubly bad. When aggregate supply shifts from  $AS_1$  to  $AS_2$  in Figure 8.9, real domestic output declines from  $Q_1$  to  $Q_2$  and the price level rises from  $P_1$  to  $P_2$ . Falling employment and inflation, the combination we previously labelled **stagflation**, occurs. Once again, if we recall the discussion of types of inflation in Chapter 5, we will see that the price-level increase occurring here is clearly **cost-push inflation**. Conversely, the shift of aggregate supply from  $AS_1$  to  $AS_3$  indicates an increase in real output from  $Q_1$  to  $Q_3$  and a simultaneous decline in the price level from  $P_1$  to  $P_3$ .

**Cost-push inflation:** inflation associated purely with shifts in aggregate supply, due to cost factors, along a stable aggregate demand curve.

**Figure 8.9**  
**The effects of changes in aggregate supply**

A leftward shift in short-run aggregate supply from  $AS_1$  to  $AS_2$  will cause stagflation, in that real domestic output will fall from  $Q_1$  to  $Q_2$  while the price level simultaneously increases from  $P_1$  to  $P_2$ . A rightward shift of short-run aggregate supply from  $AS_1$  to  $AS_3$  will increase real domestic output from  $Q_1$  to  $Q_3$  and tend to reduce the price level from  $P_1$  to  $P_3$ .

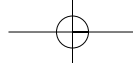


- The intersection of the aggregate demand and short-run aggregate supply curves determines the equilibrium price level and real domestic output in the short run.
- In the long run, the equilibrium level of real domestic output cannot exceed the economy's potential output.
- The aggregate demand curve may shift as a result of changes in any of its determinants. Given short-run aggregate supply, rightward shifts of aggregate demand increase real domestic output and employment as long as the economy is operating below the full-employment level of output. This comes at the cost of an increase in the price level.
- The magnitude of the impacts that increases in aggregate demand have on each of real domestic output and the level of prices depends on where the aggregate demand curve intersects the short-run aggregate supply curve, and the difference between the economy's output level and its potential output level.
- Inflation associated purely with shifts in the aggregate demand curve is known as demand-pull inflation.
- The ratchet effect is based on the fact that prices are flexible upwards, but relatively inflexible downwards. Hence, an increase in aggregate demand raises the price level, but in the short term prices cannot be expected to fall when demand decreases.

**CHECKPOINT**

## PART 2

282 macroeconomic activity and fiscal policy



- The short-run aggregate supply curve may shift when any of its determinants alters.
- Given aggregate demand, a rightward shift of the short-run aggregate supply curve increases domestic output and employment and reduces prices; a leftward shift decreases equilibrium real output and employment and increases prices.
- Inflation associated purely with shifts in the aggregate supply curve is known as cost-push inflation.

**CHECK  
POINT**

## Global watch



### Economic growth and the general level of prices

High rates of growth in GDP may put pressure on the supply side of the economy, causing an upward movement in the general level of prices. Here we

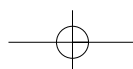
examine the relationship between the annual average rates of growth of GDP and the GDP deflator during the 1990–2000 period for a number of countries.

Country	Average annual growth rate, 1990–2000 (%)	
	GDP	GDP implicit deflator
Australia	4.1	1.5
Canada	2.9	1.4
China, mainland	10.3	7.1
China, Hong Kong SAR	4.0	4.1
France	1.7	1.5
India	6.0	8.0
Italy	1.6	3.8
Japan	1.3	0.1
Mexico	3.1	18.9
Norway	3.6	2.8
Russian Federation	−4.8	162.0
Switzerland	0.8	1.3
United Kingdom	2.5	2.9
United States	3.5	2.1

SOURCE: World Bank, 2002 *World Development Indicators*.

#### Questions

- 1 Graph the data, plotting average annual growth in GDP against the annual average growth in the GDP deflator.
- 2 Examining your graph, is it true that the countries with the highest rates of growth are those with the greatest rate of increase in the price level? Point out the exceptions to this general rule.
- 3 In which countries does it appear that supply-side pressures are clearly the cause of inflation? Justify your choices.
- 4 Refer to your analysis of the consumption–income and investment–income relationships in Global Watch, Chapter 6 and 7. Do those countries that have a poor growth–inflation pattern in the above table have any features in common? Explain.



## Price-level changes and the multiplier<sup>3</sup>

Following our consideration of the supply side of the economy and our recognition of sources of change in the general level of prices—inflation—we may now have some questions about the multiplier analysis of Chapter 7. In particular, we need to consider the impact of price-level changes on the value of the multiplier.

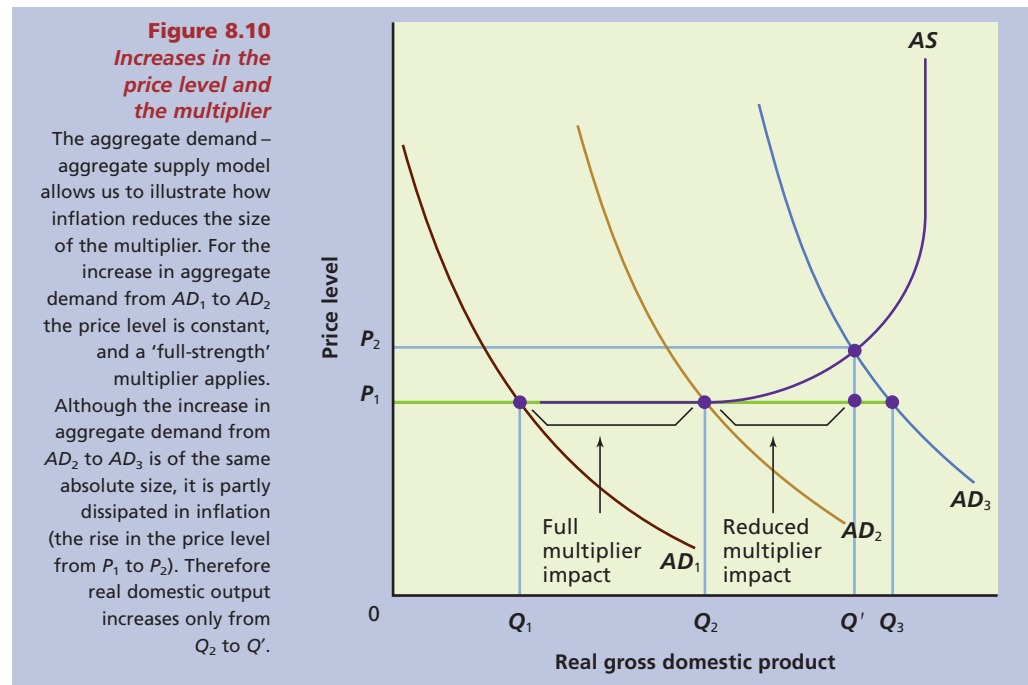
An examination of the size of the change in real GDP apparent in Figures 8.8(a) and (b) is in order at this point. We can see that the final change in the equilibrium levels of real GDP caused by shifts in the aggregate demand curve differ greatly within Figure 8.8. Indeed they reflect where the shift in aggregate demand occurs on the short-run aggregate supply curve, and the distance that the economy is from its potential output level. How do we account for these differences within the framework of our earlier multiplier analysis?

Figure 8.10 simplifies the analysis of Figures 8.8(a) and 8.8(b) by assuming the simple aggregate supply curve of Chapter 5. This allows us to focus our analysis on the situations where we are at an output level below potential output, but where increases in aggregate demand are associated with increases in the general level of prices.

At  $Q_1$  in Figure 8.10, the economy is assumed to be in a severe recession (or depression) with ample excess productive capacity and a very high unemployment rate. Thus businesses are willing and able to produce more output at existing prices. The change in aggregate demand from  $AD_1$  to  $AD_2$  will be translated fully into a change in real GDP and employment ( $Q_1$  to  $Q_2$ ) while the price level remains constant. In the horizontal range of our simple aggregate supply curve, a ‘full-strength’ multiplier is at work as was the case in Chapters 6 and 7.

We now stress that, if the economy is in an upward-sloping section of the simple aggregate supply curve, a part or all of any initial increase in aggregate demand will be dissipated in inflation and therefore not reflected in increased real output and employment. In the vertical section of the curve, reflecting long-run potential output, all increases in aggregate demand will be dissipated in price-level rises. This matches the inflationary gap discussed in Chapter 7.

In Figure 8.10 the horizontal shift of the aggregate demand curve from  $AD_2$  to  $AD_3$  is the same absolute size as the shift from  $AD_1$  to  $AD_2$ . However, a portion of the increase in aggregate



demand is dissipated in inflation as the price level increases from  $P_1$  to  $P_2$  and, therefore, is not fully reflected in increased real output and employment. Inflation weakens the multiplier so that the actual increase in GDP, from  $Q_2$  to  $Q'$ , is less than it would be on the horizontal range of aggregate supply ( $Q_2$  to  $Q_3$ ). The interest-rate effect, real-balances effect and foreign-purchases effect can be used to explain this difference in outcomes.

Our conclusions are twofold. First, for any given initial increase in aggregate demand, the resulting increase in real GDP is smaller, the larger the increase in the price level that results from the increase in aggregate demand. Increases in the price level therefore weaken the multiplier. You should draw an increase in aggregate demand equal to the  $AD_1$  to  $AD_2$  shift in the vertical range of the aggregate supply curve to confirm that this increase in spending would be entirely dissipated in inflation. There would be no multiplier effect because real GDP would be unchanged. Our second and more general conclusion is that the aggregate expenditures – output model is not sufficient for explaining situations in which changes in aggregate expenditures (and hence in aggregate demand) cause the price level to change.

- Assuming a constant price level, the aggregate demand – aggregate supply model would show the same multiplied change in real GDP as portrayed in the aggregate expenditures – output model.

- Where a shift in aggregate demand results in increases in the price level, some or all of the impact of the multiplier is lost because of the impact of inflation. This reflects the interest-rate effect, real-balances effect and foreign-purchases effect.

**CHECK  
POINT**

## Idea of the moment



Any discussion of savings in the community, and methods by which savings can be increased, needs to consider more than just some abstract marginal propensity to save for the community as a whole. A discussion of which groups in the community might save more per incremental unit of income may be the most important issue. To see this, assume that the savings function for each individual (or household) within the community takes the same basic form as the economy-wide savings function introduced in Chapters 6 and 7. Thus:

$$S_i = A_i + \text{MPS}_i (1 - \text{MRT}_i) Y_i$$

Here  $S_i$  is the level of savings for individual  $i$ ,  $\text{MPS}_i$  the marginal propensity of individual  $i$  to save,  $\text{MRT}_i$  the marginal rate of taxation faced by  $i$ , and  $Y_i$  the income of individual  $i$ .

## Savings—it's all in the details

We know that total income for the economy ( $Y$ ) is the sum of all individual incomes, and that total savings for the economy ( $S$ ) is equal to the sum of savings of all individuals ( $n$ ) in the economy, so:

$$\begin{aligned} S &= A + \text{MPS}(1 - \text{MRT})Y = \sum_i^n S_i \\ &= \sum_i^n A_i + \sum_i^n \text{MPS}_i(1 - \text{MRT}_i)Y_i \end{aligned}$$

Here  $\text{MPS}$  and  $\text{MRT}$  are the marginal propensity to save and the marginal rate of tax for the community as a whole. If we now multiply the right-hand side term in the second line of the above set of equations by 1 ( $= Y/Y$ ) and collect a few terms we get:

$$S = A + \left[ \sum_i^n \frac{\text{MPS}_i(1 - \text{MRT}_i)Y_i}{Y} \right] Y$$

From this structure, we can gain insights into the importance to aggregate savings of income distribution ( $Y/Y$ ), differences in individuals' marginal propensities to save ( $MPS_i$ ) and differences in the marginal rate of taxation ( $MRT_i$ ) faced by individuals.

Thus if we wished to increase savings, we should target those with high marginal propensities to save, typically

higher income groups who also have high ( $Y/Y$ ), and the wealthy. A reduction in the marginal rate of taxation for these groups would be the most effective tool to accomplish this goal. Tax cuts for those who have both lower income shares and lower levels of the MPS, typically those on lower incomes and with lower levels of wealth, might be more politically palatable but would be less effective.





## summary

### Max your marks!

Thirty interactive questions on aggregate demand and aggregate supply are available now at the Online Learning Centre that accompanies this book: [www.mhhe.com/au/jackson7e\\_macro](http://www.mhhe.com/au/jackson7e_macro) (for access to MaxMark, please refer to the front of this text).

- 1** The aggregate demand–aggregate supply model provides us with some basic analytical tools and a means of organising our thinking about the macroeconomic conditions our economy has encountered. With it, we are able to describe the fluctuations we have observed in our aggregate measures of the level of real output and the price level, and suggest some of the possible causes.
- 2** The aggregate demand curve shows the level of real domestic output that will be purchased at each possible price level.
- 3** The rationale for the down-sloping aggregate demand curve is based on the interest-rate effect, the real-balances effect and the foreign-purchases effect.
- 4** The interest-rate effect suggests that a higher price level is associated with increases in the level of interest rates. This may reflect an up-sloping money supply curve combined with an increase in the size of the transaction demand for money due to higher prices. Alternatively, we may argue that investors and lenders require compensation for the impact of price-level increases on the purchasing power of their funds. This is achieved by increases in the interest rate that they charge for these funds. Higher interest rates reduce consumption and investment purchases that are interest-rate sensitive.
- 5** The real-balances effect indicates that inflation reduces the real value or purchasing power of fixed-value financial assets held by households and causes them to cut back on their consumer spending.
- 6** The foreign-purchases effect suggests that an increase/decrease in Australia's price level relative to other countries reduces/increases the net exports component of aggregate demand.
- 7** The down-sloping aggregate demand curve can be derived from the expenditures–output model by varying the price level and determining how the consequent shifts in aggregate expenditures alter the equilibrium level of real domestic output. Shifts in the aggregate demand curve are associated with shifts in the aggregate expenditures curve caused by changes in the non-price-level determinants of consumption, investment and net exports.
- 8** The determinants of aggregate demand are (a) spending by domestic consumers, reflecting consumer wealth, consumer expectations, consumer indebtedness, and taxes; (b) investment expenditures by businesses, based on the following factors: interest rates, profit expectations on investment projects, the level of business taxes, technology, and the degree of excess capacity; (c) government spending; and (d) net export spending, which reflects foreign GDP growth and the level of the exchange rate.
- 9** The aggregate supply curve shows the levels of real domestic output that will be produced at various possible price levels. In discussing aggregate supply, we must distinguish between the short-run aggregate supply curve and the long-run aggregate supply curve. The short run is a period over which it is assumed that wages are largely fixed because of the presence of contracts and awards.
- 10** The shape of the short-run aggregate supply curve depends on what happens to production costs—and therefore to the prices businesses must receive to cover costs and make a profit—as real domestic output expands. At low levels of real domestic output, substantial and high unemployment mean that production can be increased with little increase in cost and, therefore, prices. As output increases towards the full-employment output level, costs increase more rapidly as production bottlenecks appear and less efficient equipment and workers are employed. Prices must therefore rise to a greater degree as real domestic output is expanded in this range. When the economy reaches its potential output level, consistent with its natural rate of unemployment, real domestic output is at a maximum and cannot be increased over the longer term. This is the location of the long-run supply curve.

- 11** The determinants of aggregate supply are input prices, productivity, and the legal and institutional environment. All else being equal, a change in one of these factors changes per-unit production costs at each level of output and therefore alters the location of the short-run aggregate supply curve. Where these factors affect the ability of the economy to produce, they also cause shifts in the position of the long-run aggregate supply curve.
- 12** The intersection of the aggregate demand and short-run aggregate supply curves determines the equilibrium price level and real domestic output in the short run. However, in the long run the equilibrium level of real domestic output cannot exceed the economy's potential output.
- 13** The aggregate demand curve may shift as a result of changes in any of its determinants—consumer, investment and government spending and the level of net exports. Given short-run aggregate supply, rightward shifts of aggregate demand increase real domestic output and employment, and increase the price level.
- 14** The impact that increases in aggregate demand have on real domestic output and the price level depends on the position at which the aggregate demand curve cuts the short-run aggregate supply curve. The distance of the economy from its potential output level influences the response of short-run aggregate supply to changes in aggregate demand.
- 15** At low levels of output and employment, an increase in aggregate demand has a significant impact on output levels but relatively little impact on the price level. As the economy approaches its long-run potential output level, increases in aggregate demand are increasingly dissipated in increases in the price level and have a relatively lower impact on real output. The inflation that results purely from shifts in the aggregate demand curve is known as demand-pull inflation.
- 16** The ratchet effect reflects the fact that prices are flexible upwards, but relatively inflexible downwards. Although an increase in aggregate demand raises the price level, prices may not fall in the shorter term in response to a decrease in aggregate demand. This stickiness reflects a number of factors: (a) the high share of wage costs in total costs of firms and the tendency to hire more workers as output increases; (b) a desire not to reduce workforce morale and productivity through redundancies (it is difficult to make only the less productive in the workforce redundant); (c) monopoly power; and (d) menu costs.
- 17** The short-run aggregate supply curve may shift when any of its determinants alters. Given aggregate demand, a rightward shift of the short-run aggregate supply curve increases domestic output and employment and reduces prices, and a leftward shift decreases equilibrium real output and employment and increases prices. Inflation associated purely with shifts in the aggregate supply curve is known as cost-push inflation.
- 18** Assuming a constant price level, the aggregate demand–aggregate supply model would show the same multiplied change in real GDP as portrayed in the aggregate expenditures–output model. Thus the multiplier would be the same as that for the simple aggregate expenditures model of the economy.
- 19** More realistically, where a shift in aggregate demand results in increases in the price level, some or all of the impact of the multiplier is lost. This is because of the impact of inflation and reflects the interest-rate effect, real-balances effect and foreign-purchases effect.



## Key terms and concepts

aggregate demand curve	259	interest-rate effect	260
aggregate supply curve	269	long-run aggregate supply curve	271
cost-push inflation	282	productivity	274
demand-pull inflation	279	ratchet effect	279
determinants of aggregate demand	263	real-balances effect	261
determinants of aggregate supply	271	short-run aggregate supply curve	269
equilibrium real domestic output and price level	277	stagflation	282
foreign-purchases effect	261		



## review questions

- 1 Explain in detail why the aggregate demand curve is down-sloping. Specify how your explanation differs from the rationale behind the down-sloping demand curve for a single product.
- 2 What are the determinants of aggregate demand? What is the impact of changes in each on the position of the aggregate demand curve?
- 3 Distinguish between short-run and long-run aggregate supply. What is the short run? What assumption is critical to the development of the short-run aggregate supply curve as distinct from the long-run aggregate supply curve? Explain.
- 4 What determines the position of the long-run aggregate supply curve? Can we exceed the economy's potential output level in the short run? Explain.
- 5 Explain the shape of the short-run aggregate supply curve, accounting for the differences in its slope as we approach the economy's long-run potential output level.
- 6 What are the determinants of aggregate supply? Describe how changes in each affect each of the short-run and the long-run aggregate supply curves.
- 7 What is the ratchet effect? On what ideas is it based, if we assume that wage rates are essentially fixed in the short run? Explain.
- 8 What is demand-pull inflation? What is cost-push inflation? Explain the sources of each and distinguish clearly between the two.
- 9 Explain the following two statements:
  - (a) 'The aggregate expenditures model is an unemployment model; the aggregate demand – aggregate supply model is an inflation model.'
  - (b) 'The aggregate expenditures model can explain demand-pull inflation, but the aggregate demand – aggregate supply model is needed to explain cost-push inflation.'
- 10 What is the impact of price-level changes on the multiplier? Explain.



## problem-solving exercises

- 1 Using appropriate diagrams, reconcile the aggregate expenditures – income model and the aggregate demand curve of the aggregate demand – aggregate supply model.
- 2 What effects might each of the following have on aggregate demand or short-run and long-run aggregate supply curves?
  - (a) a widespread fear of depression among consumers
  - (b) the sale of wheat to the Russian Federation
  - (c) a tax leading to a 5c per litre increase in petrol prices
  - (d) an increase in the money supply
  - (e) a cut in Commonwealth spending for higher education
  - (f) an increase in interest rates
  - (g) the discovery of cheaper energy sources
  - (h) tax reductions
- 3 Assume that the economy is in equilibrium at a level of output below that associated with full employment in the economy. Show, graphically, methods by which the economy might be moved towards full employment. Which variables would have to be affected in each case to bring about the relevant changes in aggregate supply or aggregate demand? Which of these variables is it most likely that government could influence strongly? Explain.
- 4 Explain how an increase in demand that increases real domestic output towards the full-employment level may generate instability in the price level. What term is used to refer to this effect?
- 5 Explain how the price level might be ratcheted upwards when aggregate demand increases. Use diagrams to show the implications for output and employment.
- 6 Draw an aggregate demand – aggregate supply diagram where equilibrium occurs below the full-employment level of output. Now show the impact of a leftward shift in the aggregate supply curve. What developments might cause such a shift?
- 7 Using diagrams, explain how an up-sloping aggregate supply curve might weaken the multiplier effect.
- 8 Use an aggregate demand – aggregate supply diagram to distinguish between demand-pull and cost-push inflation.



## application questions

- 1 'Unemployment can be caused by a leftward shift of aggregate demand or a leftward shift of aggregate supply. The first problem may be easier to resolve.' Do you agree? Explain your reasoning.
- 2 During the 1980s the Labor government reached an agreement with the union movement that reduced the rate of increase in money wages and allowed real wages to fall. This was known as the Accord. In terms of the determinants of supply, which determinants would have been most strongly affected by this agreement? Use the aggregate demand – aggregate supply model to show how the impact of the Accord would have influenced the path of prices and real output over the decade.
- 3 Consider the data in the table opposite. Graph the data in price level – real GDP space. Draw aggregate demand and aggregate supply curves through each data point. Based on this, discuss whether demand-pull or cost-push inflation appears to have had the dominant influence in increasing the general level of prices over each of the 5-year periods in the sample data.

	<b>GDP chain price index (2000–01 = 100)</b>	<b>Real GDP (2000–01 prices, \$ million)</b>
1987–88	70.9	438 466
1988–89	77.0	456 204
1989–90	81.6	473 223
1990–91	84.1	472 791
1991–92	85.7	474 059
1992–93	86.7	491 411
1993–94	87.6	510 526
1994–95	88.3	532 557
1995–96	90.6	554 920
1996–97	92.0	575 950
1997–98	93.3	601 614
1998–99	93.5	633 723
1999–00	95.5	659 002
2000–01	100.0	672 233
2001–02	102.7	697 606

SOURCE: Reserve Bank of Australia, *Bulletin*, September 2002.

- 4 Based on your knowledge of recent Australian economic history, briefly outline the factors that have dominated the shifts implied in the aggregate demand–aggregate supply schedules in the previous question.



## Economics in reality

*Governments need to plan for long-term changes in one of the fundamental inputs in the economy—labour. This is particularly the case as the population ages and birth rates continue to decline.*

The prospect of an ageing population need not be feared provided the right policies are instituted in time. Forecasts of how an economy, society or the world will look in 40 or 50 years don't have a happy history. A notorious example is the report of the Club of Rome, *The Limits to Growth*, published in 1972. This report painted a picture of looming global catastrophe, with the world running out of food and

resources unless governments moved to limit population growth and industrial production. Now, 30 years later, Western nations are becoming increasingly alarmed about falling birth rates and ageing—and declining—populations. The latest in a series of reports on the challenges of ageing populations is the federal Treasury's Intergenerational Report. Is this another Club of Rome exercise? Certainly some economists question how worried we should be. In 1999 the Productivity Commission and the Melbourne Institute held a path-breaking conference on the policy implications of an ageing population. One of the speakers was Paul Johnson of



the London School of Economics, who argued that much of the alarmist discussion of the consequences, particularly economic consequences, of an ageing population was overblown. 'Our societies have experienced massive economic and social changes over the past 40 years which are of an equivalent magnitude, but which have been accommodated by largely unplanned adjustments to existing patterns of behaviour,' Johnson said. But he was careful to say this did not mean there was no role for public policy. This involved getting long-run revenue and expenditure in balance and making sure the general policy environment promoted economic efficiency. As Johnson, and Treasury, point out, Australia is already well placed compared with many countries to deal with population ageing because of sound fiscal policies that have not left it with large unfunded pension liabilities. But according to Treasury's latest calculations, on present policies the required adjustment to taxes and spending to meet the costs of population ageing is still about 5 per cent of gross domestic product by 2042—\$87 billion in today's dollars.

One response to this, for example, in an editorial in the *Australian Financial Review* last week, has been to simply accept that tax increases are inevitable to close this gap. On Thursday the same paper ran an article by two economists, Ross Guest of Griffith University and Ian McDonald of the University of Melbourne. They argue that a tax increase of 5 per cent of GDP in 40 years' time, when they calculate living standards will be 76 per cent higher, is nothing to worry about. They say the disincentive effect of this higher taxation on labour supply will be quite small. Should we agree that such an increase in the tax burden is inevitable and acceptable? No, we shouldn't. The potential tax increase is not trivial. For instance, if we were to hold the ratio of income taxes to GDP constant, the GST rate would have to rise from 10 per cent to more than 20 per cent. And that would still leave us with marginal income tax rates among the highest in the developed world. There is an alternative. If future economic growth rates can be improved and the huge government spending on middle-class welfare cut, the 5 per cent fiscal gap can be closed without tax increases. Indeed the key to a good growth performance is lower rather than higher taxes. This is obvious if we do a growth accounting exercise to look

at the sources of growth over the next 40 years. In broad terms the sources of growth are productivity and labour force growth, and the latter can be broken down into population growth, the labour force participation rate, the unemployment rate and hours worked. All of these can, and will, be affected by the level of taxation. For example, we need a high intake of skilled workers, and to build and retain our own skills base. It won't happen if we continue to punish skilled earnings with a penal top marginal tax rate. Skilled workers will go elsewhere to countries, such as the US, with lower taxes. The same is true of the capital we need for the investment that drives productivity and our future growth rate and living standards. Taxes on capital and on corporate income are already being competed down around the world, and this competition will intensify. And as our workforce ages, we will need to keep more and more older workers active, many of whom will prefer to be casual and part-time workers.

Most of the evidence on the effect of higher taxes on work incentives is based on full-time, prime-age workers with families, who are largely trapped in the workforce. However, as more and more of the workforce is composed of part-time and casual workers, it will become much more sensitive to tax rates and much more prone to stop working if rates are too high. A much flatter income tax scale with lower rates would also reduce the poverty traps that discourage re-entry into the workforce. The price of these growth-enhancing tax cuts would be a slashing of middle-class welfare, so that people who can afford it become responsible for more of their health, education and medical care—something that is in any case desirable because of the burgeoning costs of many of these services. Yet Australia is stuck with a polity that on the government side is busy spending future budget surpluses on more middle-class welfare and irresponsible populism, and on the Labor-Democrat side is obsessed with redistributing rather than generating wealth, and willing to play short-term political games to block even the modest reforms attempted.

This is a recipe for an ever-growing tax burden and economic underperformance.

SOURCE: A. Wood, *Australian*, 21 May 2002, p. 13.



## Questions

- 1** How does an ageing population translate into a decrease in the availability of labour? Explain.
- 2** What would a decrease in the availability of labour resource do to the price of labour? What effect could this have on the aggregate supply curve?
- 3** All else being equal, what happens to the price level and real GDP when the aggregate supply curve shifts to the left? And to the right?
- 4** What does the author of this article suggest that governments should do to respond to an ageing population? Does this make sense to you? Explain.



Search for more on aggregate demand and aggregate supply on PowerWeb, available from the Online Learning Centre that accompanies this book: [www.mhhe.com/au/jackson7e\\_macro](http://www.mhhe.com/au/jackson7e_macro) (for access to PowerWeb, please refer to the front of this text).

## notes

- 1** This section assumes a knowledge of the aggregate expenditures model of Chapters 6 and 7. Some instructors may wish to skip this section if these chapters are not set as part of the subject.
- 2** This section assumes a knowledge of the aggregate expenditures model (Chapters 6 and 7). Instructors who wish to rely only on the aggregate demand–aggregate supply model may skip this section.
- 3** Instructors who did not set Chapters 6 and 7 may find it useful to discuss the concepts of the MPC, MPS and multiplier here.