

The aggregate demand / aggregate supply model

The Keynesian aggregate expenditure model and the multiplier principle enable us to develop an understanding of the economic impact of changes in any of the components of aggregate expenditure.

The aggregate expenditure model, however, only shows the impact of a change in spending on output. It says nothing about the impact of changing expenditure on the general price level. This is an important omission – it means the model says nothing about inflation (one of the ‘twin evils’ associated with the business cycle).

The aggregate expenditure model also only focuses on the demand side of the economy – it ignores the supply side. This means that the effect of changes in important economic variables such as the labour force, the capital stock, the level of technology and rising productivity are not considered.

The purpose of this chapter is to introduce a more complete macroeconomic model – the aggregate demand/aggregate supply model (for which we use the AD/AS model abbreviation).

Aggregate demand

Aggregate demand is the total amount of demand for final goods and services in an economy at any point in time. This is a similar definition to the aggregate expenditure definition introduced in chapter 9. The way the concept is presented

It is important to note that the aggregate demand curve is very different to the demand curve for an individual good or service studied in microeconomics.

in this model, however, is different. As illustrated in figure 10.1, the AD curve describes a negative (downward sloping) relationship between the level of aggregate demand and the overall price level. The x-axis shows the level of output produced in the economy – we usually label this as Real GDP, as this shows the value of output produced.

There are three reasons behind the negative relationship between AD and the price level:

- the income or wealth effect;
- the interest rate effect; and
- the open economy effect.

Firstly, a rise in the price level (inflation) reduces the purchasing power of household income or wealth. If prices were to rise by 10 per cent tomorrow, would you be able to buy more or less goods and services? The answer, of course, is less (assuming no increase in your income). As the price level increases, the purchasing power of household income falls, so consumption (a key element of aggregate demand) also falls.

Secondly, inflation affects interest rates. A rise in the general price level means that households and firms will demand more funds to finance their transactions. They could do this by withdrawing money from banks, by borrowing, or by selling

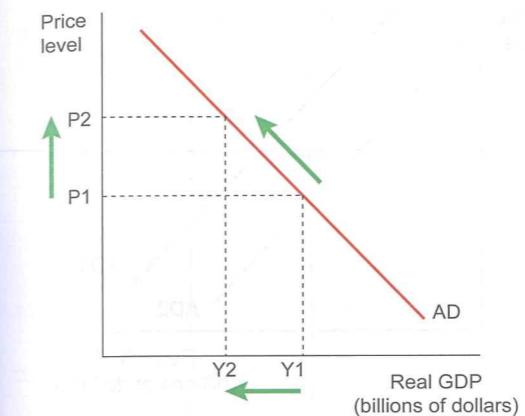


Figure 10.1 The aggregate demand (AD) curve

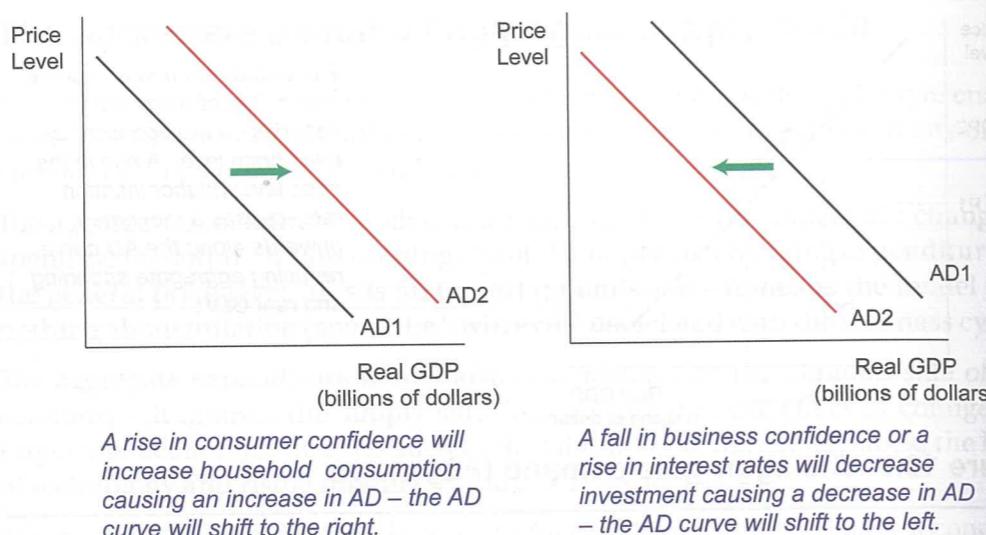
financial assets such as bonds. The rising demand for money drives interest rates upwards, increasing the cost of borrowing and creating a disincentive to spend. This is called the interest rate effect – a rise in the price level increases interest rates, which has a negative impact on the investment and consumption components of AD.

Thirdly, the downward slope is partly explained by the ‘international’ or ‘open economy’ effect. If the domestic price level (inflation) rises relative to other countries, domestically produced goods and services become less competitive with those produced overseas, leading to a reduction in export revenue. At the same time, a rise in the domestic price level will mean that consumers and business firms will purchase more goods and services from foreign producers, and less from domestic producers. In other words, an increase in the price level will decrease net exports ($X - M$).

In summary, increases in the general price level (inflation) can be expected to reduce total spending in the economy – a movement up and to the left along the AD curve, as illustrated in figure 10.1. Falls in the price level, on the other hand, can be expected to increase total spending in the economy and cause a movement down, and to the right, along the AD curve.

Shifts of the aggregate demand curve

The whole AD curve will shift to the left or the right if factors other than the price level were to change. This refers to the actors that influence consumption (C), investment (I), government spending (G) or net exports (NX). If, for example, the government reduced income tax, disposable income will rise and household spending will tend to increase. The AD curve would shift to the right – described as ‘an increase in AD’. An increase in AD increases real GDP, income and employment. Other events that might cause an increase in consumption include a rise in consumer confidence, a fall in interest rates, or an increase in household wealth driven by rising share prices or property values.

**Figure 10.2 Shifts in aggregate demand**

The AD curve would shift to the left if, for example, investment spending fell because of a decline in business confidence or a rise in interest rates. A decrease in AD will reduce real GDP and employment.

Changes in government spending would also shift the AD curve. An increase in government spending would shift the AD curve to the right, while a decrease in government spending will shift the AD curve to the left.

Changes in global economic growth will have an impact on Australia's exports. Higher economic growth in China, for example will increase Australia's exports and shift the AD curve to the right, increasing real GDP and employment.

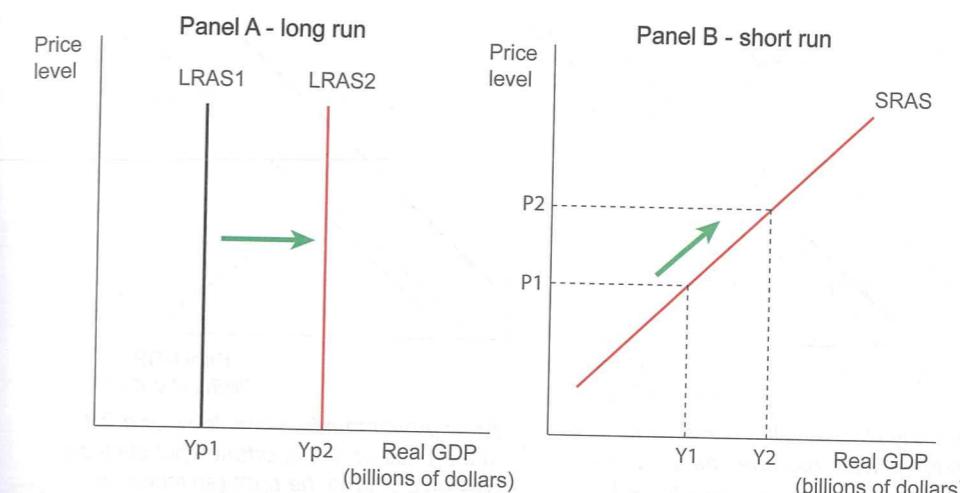
Figure 10.2 illustrates the impact of some economic events on the AD curve.

The aggregate supply curve

In building the AD/AS model, we develop two aggregate supply curves – the long run aggregate supply curve (LRAS), and the short run aggregate supply curve (SRAS).

The LRAS curve is vertical because it represents the maximum level of output at a particular point in time. The position of the LRAS curve is determined by:

- the size of the population (the number of households buying goods, and the potential size of the work force);
- participation in the work force; and
- the productivity of labour influenced by the stock of capital equipment and the state of technology.

**Figure 10.3 Long run and short run aggregate supply curves**

Potential GDP is independent of the price level. Over time, the potential level of output (Y_p) increases, as illustrated by Panel A of figure 10.3. Over the long term in Australia, the annual rate of increase of potential output is around 3 per cent.

The LRAS curve shows the economy's maximum or potential level of GDP when all resources are fully employed. The LRAS curve is vertical – the price level does not influence potential output.

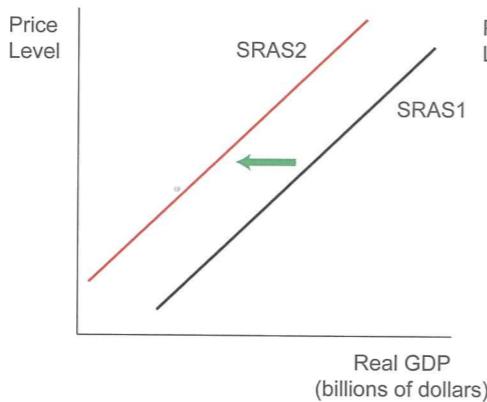
The potential level of output and income (Y_p) is unlikely to correspond to a zero rate of unemployment. In recent times, the continuing presence of both frictional and structural unemployment suggests there is a natural rate of unemployment – around 4 per cent of the workforce, according to the Reserve Bank of Australia (RBA).

The SRAS curve shows how an increase in economic activity increases the general price level.

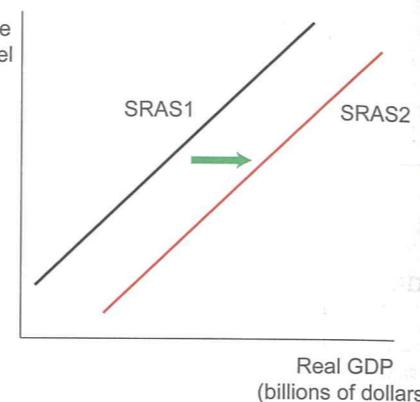
The short run aggregate supply curve (SRAS) curve is positively sloped. The aggregate supply curve describes the relationship between the total production of goods and services, and the general price level. As the level of economic activity increases, the price level rises. Why does this occur? To increase production, firms require more labour and capital, which puts pressure on resource prices. The most important cost of production is the price of labour – wages. When productive output rises, wages should begin to rise, causing the general price level to rise. This is especially true as the economy approaches its potential capacity or full employment. In panel B of figure 10.3, the SRAS curve shows that an increase in real GDP from Y_1 to Y_2 will cause the price level to rise from P_1 to P_2 because production costs have increased.

Shifts of the aggregate supply curve

Shifts in the SRAS curve are caused by events that can affect the availability of resources and/or costs of production in the short term. Some examples are



The early stages of the coronavirus pandemic were regarded as a 'supply-side' shock. Strict lockdowns in parts of China forced factories to close, disrupting supply chains in many industries across the world.



An improvement in technology, or a fall in the price of an important input such as oil would shift to the right (an increase in SRAS). The level of real GDP and employment will rise.

Figure 10.4 Shifts of the SRAS curve

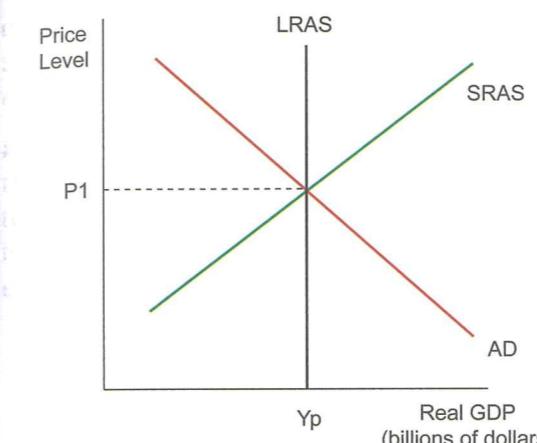
illustrated in figure 10.4. Unanticipated shifts of the SRAS curve are sometimes referred to as 'supply shocks'. Negative supply shocks cause an leftward/upward shift in the SRAS curve, whilst a positive supply shock would cause a rightward/downward shift.

It is important to distinguish the factors that can shift the short run AS curve from those factors that will shift the long run AS curve. Any changes in input prices, such as the price of oil, the price of labour (wages) and raw materials will shift the SRAS curve, but not the LRAS curve. Significant weather events often cause a negative supply shock – in 2021-2022, the concurrent La Niña event and positive southern annular phase brought significant flood disruption to the Queensland and NSW economies.

Changes in the quantities of factors of production, on the other hand, will shift both short run and long run aggregate supply. For example, the COVID-19 pandemic resulted in dramatic cuts in migration to Australia, meaning a leftward shift in both short run aggregate supply (shortages of labour) and long run aggregate supply (reduced population growth).

Macroeconomic equilibrium

The economy is in short run equilibrium at the point where the AD curve intersects the SRAS curve. This is the economy's actual level of spending, production and income. The economy is in long run equilibrium when all three curves (AD, SRAS and LRAS) intersect. This outcome implies that actual output equals potential output. This is illustrated in figure 10.5.



The economy is in long run macroeconomic equilibrium when the AD and SRAS curves intersect at the potential level of output Y_p (that is, on the LRAS curve).

A shift in either the AD curve or the SRAS curve will cause short run equilibrium to diverge from the economy's potential output, with some impact on the price level.

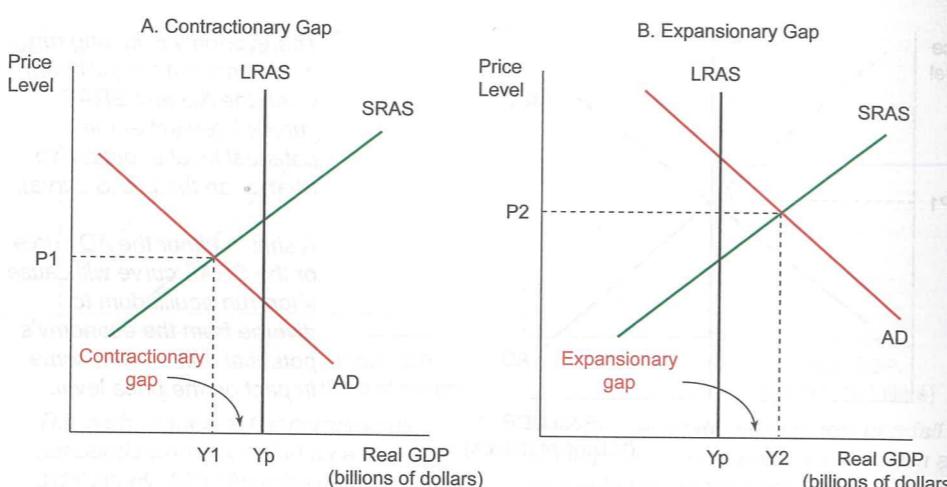
Figure 10.5 Macroeconomic equilibrium

Does the economy always operate at long run equilibrium? The answer is no. In the June quarter of 2020, for example, economic growth was negative as a result of economic disruption brought about by the pandemic. Actual GDP of \$1,880 billion was less than potential GDP, which was estimated to be around \$2,000 billion. The unemployment rate of 7 per cent was higher than the natural rate (5 per cent at the time). This suggests that the economy's short run equilibrium (AD and SRAS) intersected to the left of the LRAS curve.

Over time all three curves on the model – the AD, SRAS and the LRAS – shift to the right due to economic growth. The population and labour force grow because of natural increase and migration. The capital stock, consisting of machinery, business equipment, new housing, factories and social infrastructure also grows as new projects and businesses are developed. This means that both the short run and the long aggregate supply curves are shifting to the right. At the same time, aggregate demand tends to increase due to the increase in aggregate consumption and investment that economic growth brings. But the AD curve may not shift at the same rate as the AS curves. At any point in time the economy's short run equilibrium may be below, or above, its potential. We therefore distinguish two types of short run outcomes – a contractionary gap and an expansionary gap.

These 'gaps' are illustrated in figure 10.6. The model in panel A shows the economy in short run equilibrium below the full employment (natural rate) level of real GDP (Y_p). The AD curve intersects the SRAS curve to the left of the LRAS curve. This is a contractionary gap because the current equilibrium level of real GDP (Y_1) is less than potential GDP.

What might 'long run macroeconomic equilibrium' look like in Australia? The rate of unemployment would be 4.5 per cent; the rate of inflation would be in the 2-3 per cent band, and the growth rate of GDP would be 3.25 per cent.



In panel A, short run equilibrium is below the potential level of output - AD intersects SRAS to the left of the LRAS curve. The contractionary gap is the distance between Y_1 and Y_p . Economic indicators will reflect the output gap (for example the unemployment rate will rise; business investment will tend to fall; inventories will rise).

In panel B, short run equilibrium above potential - AD intersects SRAS to the right of the LRAS curve. The expansionary gap is the distance between Y_p and Y_2 . We would expect to see low unemployment; wage rises; strong retail sales and corporate profit, and we would upward pressure on prices.

Figure 10.6 Contractionary and expansionary gaps

Characteristics of a contractionary gap include:

- lower rates of inflation, due to spare capacity in the economy;
- higher levels of cyclical unemployment;
- a fall in the labour force participation rate if unemployed workers feel they have less chance of finding a job;
- lower company profits;
- slower growth of consumer expenditure (especially on durables);
- increased need for social security (the Jobseeker allowance);
- lower interest rates; and
- a decrease in the current account balance will increase investment relative to savings.

In other words, an economic downturn! Will an economy become 'stuck' in a contractionary or recessionary gap? No, because the economy has a self correcting mechanism to push the economy to its long run equilibrium. When actual GDP is below potential GDP, the unemployment is above the natural rate. This should cause real wage increases to slow, shifting the short run AS curve to the right, moving the economy back towards potential GDP. At the same time, aggregate

demand may start to rise as consumer and business confidence improves or as the government and/or the Reserve Bank implements expansionary policies to encourage private sector spending.

Panel B shows the economy in short run equilibrium at a level of real GDP higher than the natural employment level (Y_p). The AD curve intersects the SRAS curve to the right of the LRAS curve. This is an expansionary gap – the equilibrium level of real GDP (Y_2) is greater than potential GDP (Y_p). Characteristics of an expansionary gap include, for example:

- wage inflation if there is a tight labour market (competition for workers);
- an increase in the participation rate, as people expect they will be able to find a job if they seek work;
- lower levels of cyclical unemployment – consumer demand for goods and services is high, so firms need to employ labour to produce those goods and services;
- an increase in company profits and business confidence;
- increased consumer confidence and sales of consumer durables and luxury items;
- reduced need for cyclical welfare payments, such as unemployment benefits (JobSeeker); and
- the current account balance will fall if investment increases relative to savings.

Will the economy become stuck in an expansionary or inflationary gap? Again, the answer is no, because the economy has self-correcting mechanisms to restore its long run equilibrium. These were outlined when we discussed the upper turning point of the business cycle in chapter 9. In addition, we would also expect tighter fiscal and monetary policies to reduce spending in the economy which will shift the aggregate demand curve to the left.

The AD/AS model and the business cycle

The AD/AS model helps us to visualise expansions and contractions of the business cycle and the associated problems of unemployment and inflation.

Firstly, we use the AD/AS model to show how an economy can experience a downturn or contraction in activity. We begin by assuming the economy is initially in long run equilibrium at its potential GDP. As shown in panel A of figure 10.7, the level of aggregate demand (AD1) matches short run aggregate supply (SRAS) at the economy's potential level of output Y_p (that is, on its LRAS curve). The price level (rate of increase) is P_1 .

Panel A then shows the impact of a reduction in aggregate demand from AD1 to AD2. Firms would react to lower demand by cutting production, so income and

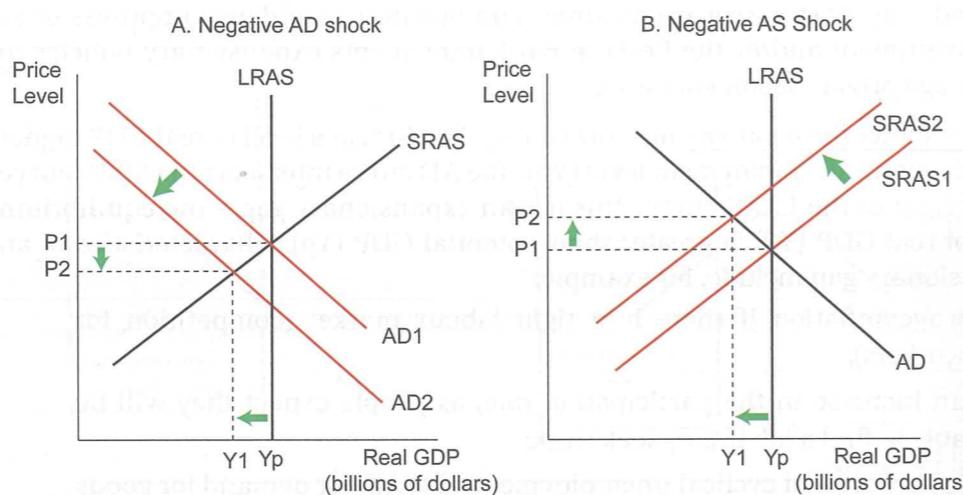


Figure 10.7 Using the AD/AS model to show a contraction

employment would fall. Real output would fall from Y_p to Y_1 . Reduced inflationary pressure sees the price level fall from P_1 to P_2 .

Panel B shows how a contraction could result from a negative supply shock – perhaps a rise in world oil prices, a natural disaster, or problems with the supply chain like those during the pandemic. The model again shows that the equilibrium level of output falls from Y_p to Y_1 , but this time prices rise from P_1 to P_2 because these supply shocks cause production costs to rise, causing upward pressure on prices. The term ‘stagflation’ was coined to refer to a negative supply shock – a stagnant (lower growth) economy in which prices are rising due to higher costs.

The AD/AS model could also be used to show a business cycle expansion. In Australia’s recent mining construction boom, investment spending and strong commodity exports drove increases in output, employment and income. The economic growth rate jumped to 4.4 per cent – well above the long term average. Economic growth in Queensland and WA was nearly 10 per cent in one year! The unemployment rate fell to just 4 per cent – well below the natural rate of unemployment at that time. The increase in investment and exports would be modeled as a rightward shift in aggregate demand, leading to an increase in economic activity (higher production, employment and aggregate incomes), perhaps with some pressure on the price level as the economy nears its capacity.

An expansion that is caused by the short run AS curve shifting to the right will cause inflation to fall. This could occur, for example, if new technologies boosted labour productivity or reduced energy prices.

Now that we have introduced the Keynesian and aggregate demand/aggregate supply models we again review Australia’s business cycles since 1980. Figure 10.9 is based on the same data as figure 8.1 from chapter 8.

Figure 10.8 An alternative AD/AS model

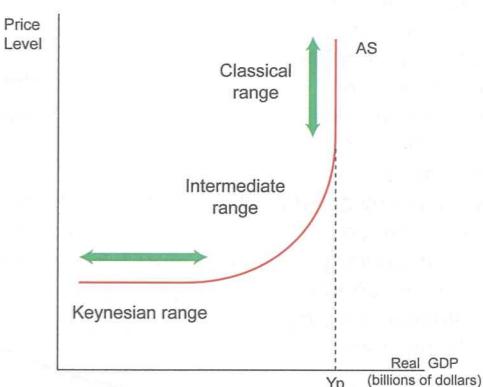
An alternative AD/AS model combines the SRAS curve and the LRAS curve into one curve – as shown at right.

When the economy is in a trough, as in the second diagram, aggregate demand is very low, and would intersect the AS curve in its ‘Keynesian’ range, where the AS curve is flat or horizontal. The economy has significant spare capacity, so the economy can expand (AD shifts from AD_1 to AD_2) with little impact on prices.

As the economy approaches its full employment or natural rate of output, the AS curve starts to slope upwards. This is referred to as the ‘intermediate’ range of the AS curve. Rises in real GDP caused by an increase in AD from AD_3 to AD_4 (third diagram) cause the price level to increase because labour and other factor markets are beginning to tighten. Competition among producers for reduced supplies of resources will cause their prices to increase (especially as production and employment levels rise and the economy is closer to potential output).

When the economy reaches the full employment level of output (Y_p), the AS curve becomes vertical. This is referred to as the ‘Classical’ range of AS. Increases in economic activity, such as a shift from AD_5 to AD_6 (lower diagram) have no impact on real GDP because the economy is at full capacity. An increase in aggregate demand would be highly inflationary.

In this version of the AD/AS model, the ranges of the AS curve describe different phases of the business cycle. The Keynesian range is typical of an economy in a recession or trough. The level of real GDP is below the full employment level and unemployment is high. The Classical range describes an economy in a boom – the economy has reached its full employment potential (at the natural rate of unemployment) and higher levels of aggregate demand put pressure on the price level. Between these extremes, the economy would be in an Intermediate range.



The blue line shows the potential GDP over the period 1980–2022 consistent with a 3 per cent annual growth rate (until 2018 - 2.7% after that). This is determined by growth in the workforce and in productivity. The red line shows movements of actual GDP growth around potential GDP.

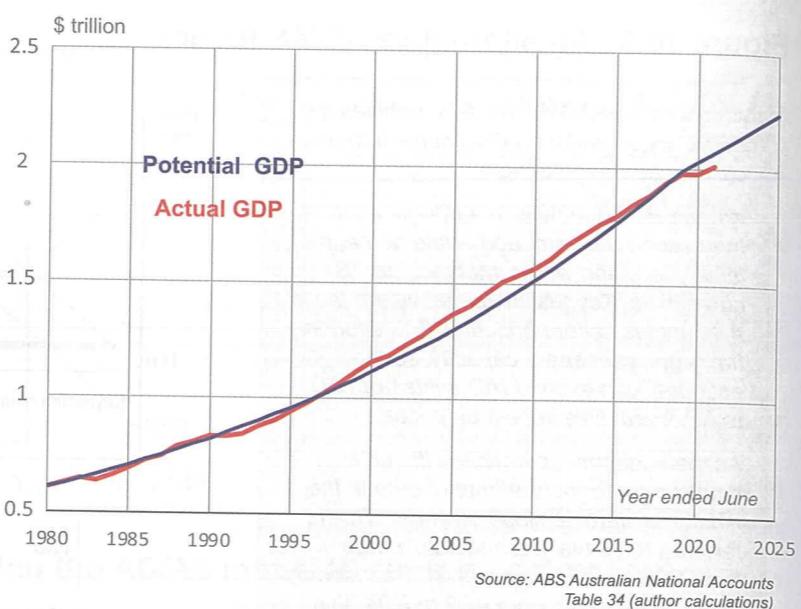


Figure 10.9 Australia - actual vs potential GDP since 1980

The blue line shows the potential GDP that would result from a consistent year-by-year shift in LRAS due to increases in the factors we have mentioned previously – growth in the labour force (due to natural increase and migration), increasing capital stock, technological change and increases in productivity. The potential GDP line is slightly curved due to the effect of compounding (although we cut the rate slightly after 2020 due to the expected long term impact of the pandemic).

The red line shows actual GDP (expenditure) rates over the same period. When the red line is above the black one, output was ‘above potential’. When actual GDP is below potential, the economy is experiencing a contraction, with levels of output income and expenditure below their long term potential. The contractions of 1983, 1991, 2008 and 2020 are again evident.

This diagram gives a realistic portrayal of the business cycle over a long period of time. Economic activity rises slowly at about 3 per cent per annum compounded. Cycles of expansion and contraction vary actual performance a few percent either way in the short term. The chart also shows the ‘long boom’ in the Australian economy that occurred between 1991 and 2020 – 29 years without a recession (although there were three individual quarters of negative growth).

Worksheet - the AD/AS model

Read chapter 10 to answer the following questions.

1. What three key macroeconomic variables does the AD/AS model explain?
2. Define aggregate demand. What are the elements of AD?
3. Draw an AD curve. In what way are the axes different to the AE model?
4. How does an increase in the price level affect aggregate real income?
5. Why would a rise in the price level in the economy tend to increase interest rates?

6. Explain what is meant by the ‘open economy’ effect?
7. List two events that could lead to an rightward shift in the AD curve.
8. What effect would a 10 per cent fall in ASX share prices have on the AD curve? Explain. Explain the term ‘aggregate supply’.
9. Explain why the LRAS curve is vertical.
10. Explain why the SRAS curve is upward sloping.
11. List two events that could lead to a leftward shift of the SRAS curve.
12. Explain the difference between short run and long run macro equilibrium.
13. Draw a diagram to illustrate a contractionary or expansionary gap. Provide an explanation for the economy to be not at full employment equilibrium.
14. Explain how the economy will ‘self correct’ if actual GDP is less than potential GDP.
15. Explain why the LRAS curve typically shifts to the right over time.
16. What impact does improving technology over time have on the economy? Use the AD/AS model to support your answer.
17. Using the AD/AS model, explain the impact on the price level, real GDP and unemployment of the events below. Assume in each case that the GDP is currently slightly below its potential.
 - a. lower economic growth in China
 - b. the COVID-19 pandemic.
 - c. an appreciation of the AUD.
 - d. a decrease in the terms of trade.

News extract

Read the extract from the RBA Monetary Policy Meeting minutes, and answer the questions that follow.

Economic conditions August 2022

The outlook for business investment remained positive through the month. The June quarter ABS Capital Expenditure Survey, conducted in July and August, indicated that non-mining firms expected to increase investment in the 2022/23 financial year, driven by investment in machinery and equipment. Capacity utilisation remained high across industries, with non-mining capacity utilisation at its highest level in over three decades.

The demand for labour remained robust, judging by the timely information from job ads and liaison. Most firms interviewed as part of the RBA liaison program expected to increase headcount, but some had expressed concern about their ability to do so because of poor labour availability and strong competition from other firms. Measured employment had declined in July; however, looking through the monthly volatility, the labour market remained very strong.

The employment-to-population ratio and participation rate were around record highs, and measures of spare capacity were at their lowest levels in decades. The unemployment rate had declined further to 3.4 per cent in July. Members noted recent announcements that staffing levels in visa processing would be increased to clear backlogs in this area. Immigration of skilled workers, students and working holidaymakers could all be anticipated to increase in the period ahead, which would add to labour supply as well as aggregate demand.

Wages growth was picking up as expected. A range of data sources, including interviews with business people, business surveys and measures based on retail banking data, indicated that this pick-up had continued over prior months. In the June quarter, the Wage Price Index had increased by 0.7 per cent in the quarter and 2.6 per cent in year-ended terms. The pick-up in growth had been stronger in the private sector than in the public sector, where wages growth had remained more subdued. Wages growth had been strongest in the construction industry, consistent with information from liaison about labour costs and availability in that industry.

Source: RBA Minutes of the Monetary Policy Meeting of the Reserve Bank Board Sydney – 6 September 2022 (edited for context)