# 12 AGGREGATE DEMAND AND AGGREGATE SUPPLY

## 12.1 Aggregate demand

Learning outcomes

- Distinguish between the microeconomic concept of demand for a product and the macroeconomic concept of aggregate demand.
- Construct an aggregate demand curve.
- Explain why the AD curve has a negative slope.

In April of 2010, US president Barack Obama's chief economic advisor, Dr Christina Romer, delivered a speech at Princeton University about the causes of the deep recession the US was in the midst of at the time, when unemployment was at 10%, its highest level in decades.

*This rise in long-term unemployment is readily explained by the prolonged collapse of aggregate demand. When hiring rates are very depressed, workers who lose their jobs are unlikely to find work quickly, and thus face a substantial chance of becoming long-term unemployed ... Thus, the rise in long-term unemployment is the almost inevitable consequence of the severe recession ... There is every reason to expect that long-term unemployment will come back down when aggregate demand recovers.*

**Dr Christina Romer, Princeton University 2010**

Christina Romer knows the importance of aggregate demand to the US economy.

This is just a short passage from her speech at Princeton, in which Dr Romer uses the phrase 'aggregate demand' 11 times. What is this all-powerful aggregate demand, and how can its collapse lead to the deepest economic crisis in much of the world since the Great Depression?

Aggregate demand (AD) is the total demand for the goods and services of a nation at a given price level and at a given period of time. Unlike demand, which represents the willingness and ability of consumers to buy a particular good or service, aggregate demand collects together the demands of *all* consumers for *all* the goods and services produced in a nation *in a given time period at different price levels*. AD measures the demand for a nation's output of goods and services in a year or its gross domestic product (GDP). There is an inverse relationship between AD and the price level: at lower price levels there is greater amount of output demanded and at higher price levels the amount of output demanded decreases.

Demand for a nation's output includes the demand for consumer goods and services by households *and* the spending of all other stakeholders, domestic and foreign, on a nation's goods and services. To better understand how AD can change in a nation we need to examine each of its components separately.

# 12.2 The components of AD

Learning outcomes

- Describe consumption, investment, government spending and net exports as the components of aggregate demand.

Demand for a particular nation's goods and services comes from households, but also from firms, the government and from foreign consumers of domestically produced goods, services and resources. There are four components that make up a country's aggregate demand.

- **Consumption (*C*).** Consumption measures all spending by domestic households on goods and services during a particular period of time. Consumption is a function of household income and the marginal propensity to consume (MPC).
- **Investment (*I*).** Investment is short for gross domestic private investment, and measures the total spending by firms on capital equipment. The level of investment in a nation is a function of the national output and the interest rate.
- **Government spending (*G*).** Government spending is short for gross government investment and spending and measures a country's government's expenditures on goods and services.
- **Net exports (*X* – *M*).** Net exports measures the total income earned from the sale of exports (*X*) to foreigners minus the total amount spent by a nation's households, firms and government on goods and services imported (*M*) from other countries. Net exports can be negative or positive, depending on whether a nation spends more on imports than it earns from the sale of its exports.

AD can therefore be expressed using the following formula:

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

Aggregate demand (AD) is the total demand for a nation's goods and services from domestic households, firms, the government and foreigners.

## The AD curve

As shown in Figure 12.1, AD is a downward-sloping curve reflecting an inverse relationship with the average price level in a nation.

At lower average price levels, more of a nation's output is demanded by households, firms, the government and foreigners; at higher price levels, less is demanded. In Figure 12.1 at a price level of $PL_1$, the quantity of national output demanded by households, firms,

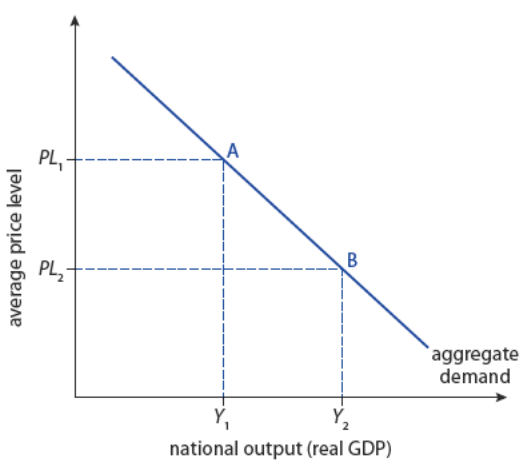


**Figure 12.1**
The aggregate demand curve.

foreigners and the government corresponds with a level of national output of $Y_1$. At a lower price level of $PL_2$, the quantity of output demanded is greater, at $Y_2$. In this regard, the AD curve is similar to the demand curve studied in microeconomics. But demand slopes downwards because of the income effect, the substitution effect and diminishing marginal utility (Chapter 2); AD slopes downwards for the three different reasons discussed below.

### The wealth effect

Higher price levels reduce the purchasing power or the real value of the nation's households' wealth and savings. The public feels poorer at higher price levels and thus demands a lower quantity of the nation's output when price levels are high. At lower price levels, people feel wealthier and thus demand more of a nation's goods and services. (This is similar to the income effect, which explains the downward-sloping demand curve.)

### The interest rate effect

In response to a rise in the price level, banks raise the interest rates on loans to households and firms who wish to consume or invest. At higher interest rates, the quantity demanded of products and capital for which households and firms must borrow decreases, as borrowers find higher interest rates less attractive. The opposite results from a fall in the price level and the decline in interest rates, which makes borrowing more attractive and thus increases the quantity of output demanded.

### The net export effect

As the price level in a particular country falls, *ceteris paribus*, goods and services produced in that country become more attractive to foreign consumers. Likewise, domestic consumers find imports less attractive as they now appear relatively more expensive, so the net expenditure on exports rises as price level falls. The opposite results from an increase in the price level, which makes domestic output less attractive to foreigners and foreign products more attractive to domestic consumers. (This is similar to the substitution effect, which explains the downward-sloping demand curve.)

The above effects explain the inverse relationship between the average price level of a nation's output and the quantity demanded by households, firms, the government and foreign consumers.

## 12.3 Determinants of AD or shifts in the AD curve

Learning outcomes

- Explain how the AD curve can be shifted by changes in consumption due to factors including changes in consumer confidence, interest rates, wealth, personal income taxes (and hence disposable income) and level of household indebtedness.
- Explain how the AD curve can be shifted by changes in investment due to factors including interest rates, business confidence, technology, business taxes and the level of corporate indebtedness.
- Explain how the AD curve can be shifted by changes in government spending due to factors including political and economic priorities.
- Explain how the AD curve can be shifted by changes in net exports due to factors including the income of trading partners, exchange rates and changes in the level of protectionism.

Just as with demand for a product (for which a change in the price leads to a movement along demand and a change in the quantity demanded), a change in the price level leads to a movement along a nation's AD curve and a change in the national output demanded. But AD will shift if any of its four components changes: any change in consumption (*C*), investment (*I*), government spending (*G*) or net exports ($X - M$) will shift the AD curve. Each of these four components has its own determinants that may cause it to increase or decrease.

## Determinants of consumption (*C*)

Households demand goods and services in a nation's product market (picture the circular flow from Chapter 1). The level of consumption in a nation depends on several factors. In many countries, household consumption makes up the single largest component of aggregate demand. Figure 12.2 shows the makeup of several countries total demand for goods and services, organized from the countries in which consumption makes up the least to those in which consumption makes up the most as a percentage of total demand.

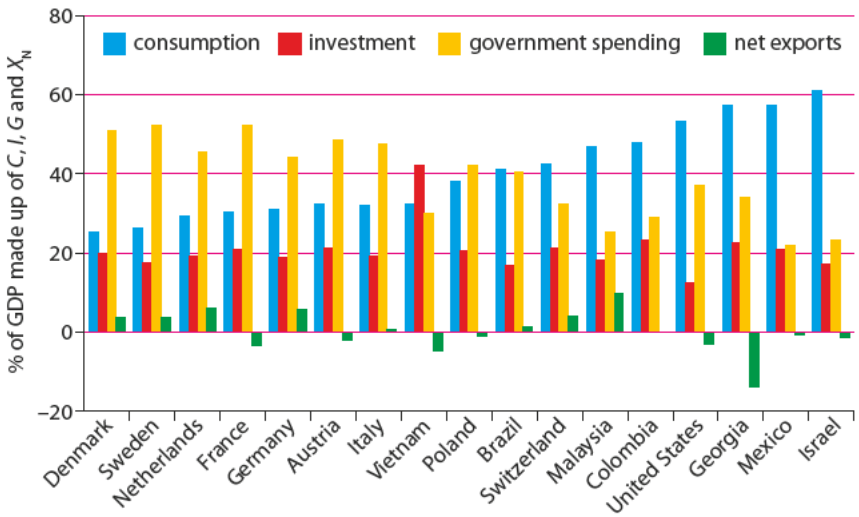


**Figure 12.2**
Aggregate demand around the world.

As you can see, the countries in which consumption is the smallest component of total demand are mostly Western and Northern European nations in which tax rates are high and government spending on public goods and services make up a much more substantial proportion of total demand. In Denmark, for instance, tax rates are over 50% for most households, which leaves little disposable income for personal consumption. The Danish government, however, provides goods and services such as education, healthcare and transfer payments such as unemployment benefits, job training and welfare at a level that results in government spending making up over 50% of the total country's total economic activity.

On the other end of the table are countries such as the US, Mexico and Israel, where income taxes are low compared to Europe, leaving more disposable income for households to consume with, which explains why consumption makes up much larger proportions of total spending.

How do the different consumption patterns of different countries reflect the cultural differences between countries? Are there cultural differences between a country like Sweden and the US that allow the vast consumption gap between such countries to be maintained?

## Level of national income

The level of national income is the primary determinant of consumption in a nation. As national income rises, the level of consumption of a nation's households rises, and as national income falls, consumption falls. A nation's income does not equal its consumption, but consumption is a function of national income. In addition to consuming

goods and services, a nation's households will also pay taxes, save, or buy imports with the income earned in a year.

### Consumption

The percentage of national income that goes towards consumption is determined by the nation's average propensity to consume (APC). APC is found by dividing the level of consumption (*C*) by the level of national income (*Y*).

$$APC = \frac{C}{Y}$$

### Savings

At lower levels of income, households tend to consume with a greater proportion of their income than at higher incomes levels. This means that the amount of income saved is less at lower income levels. The average propensity to save (APS), is savings (*S*) divided by national income (*Y*); this tells us the percentage of a nation's income that is saved.

$$APS = \frac{S}{Y}$$

### Taxes

All governments collect taxes. The percentage of the nation's income collected in taxes tells us the average rate of taxation (ART). The ART is found by dividing the total taxes collected in a country (*T*) by the national income (*Y*).

$$ART = \frac{T}{Y}$$

### Imports

Finally, households may consume goods or services produced abroad, which counts as imports to a nation and is thus not included as a part of the nation's aggregate demand and is subtracted from GDP. The average propensity to import (APM) is the percentage of national income spent on imports (*M*).

$$APM = \frac{M}{Y}$$

All of a nation's income goes towards consumption, savings, paying taxes or buying imports. Therefore:

$$APC + APS + ART + APM = 1$$

Consumption increases at a decreasing rate with income. The higher the nation's income of households, the lower the average propensity to consume.

### The Keynesian consumption function

This is a schedule showing the relationship between household consumption and income (Figure 12.3). The direct relationship between national income (*Y*) and consumption (*C*) is clearly visible.

The 45-degree dotted line in Figure 12.3 shows where consumption plus import spending equals income. When the blue consumption curve is above the dotted line at low income levels, consumption and import spending exceed national income. When income falls near to zero, consumption is sustained by dipping into savings or by going into debt. When a nation's consumption is greater than its income, the nation is experiencing dis-savings.

At higher levels of income, both consumption and savings are higher, but households consume with a smaller *proportion* of their income. Thus, as income rises, the average

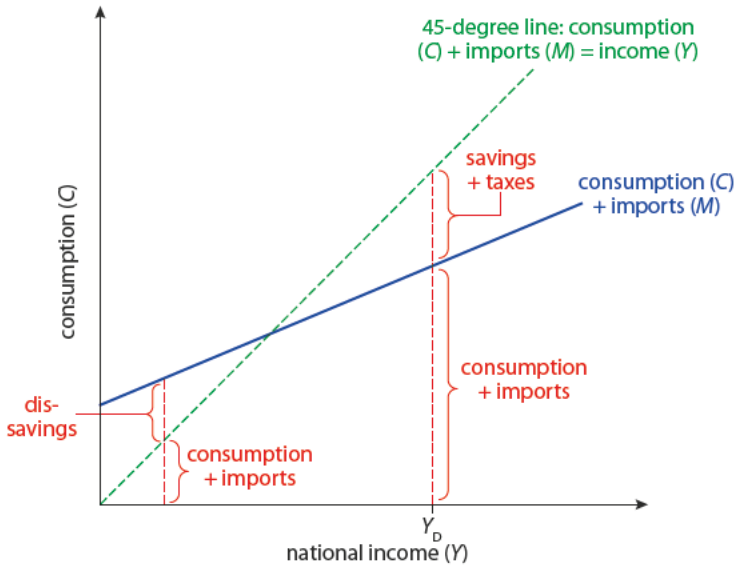


**Figure 12.3**
The consumption curve: household spending increases as national income rises.

propensity to consume falls, but total consumption increases with income. Savings also increase as income rises. Households that can afford to save tend to save at higher rates than those whose incomes are lower and who must use more of their incomes to consume, so the APS increases as income rises.

Figure 12.4 shows the levels of consumption and savings for two income levels.

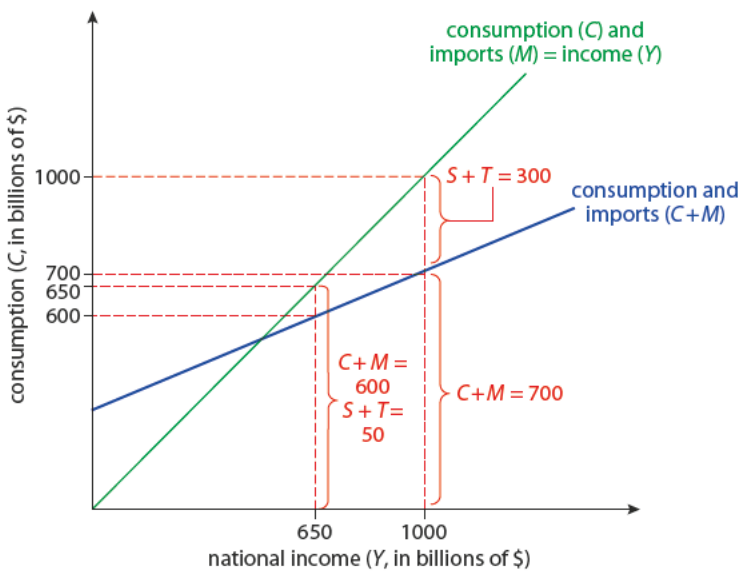


**Figure 12.4**
The consumption curve: proportion of income used for consumption decreases as income rises.

From Figure 12.4 we can observe the following points.

- When national income equals $650 billion, consumption and import spending total $600 billion. Assume consumption of domestically produced goods is $500 billion and import spending equals $100 billion
  - APC is 500/650 = 0.77
  - APM is 100/650 = 0.153
- Savings and taxes total only $50 billion when national income is $650 billion. Assume that $30 billion is taxes and $20 billion is savings.
  - ART is 30/650 = 0.046
  - APS is 20/650 = 0.031

- APC + APM + ART + APS = 1:
  - 0.77 + 0.153 + 0.046 + 0.031 = 1
- When national income rises to $1000 billion, consumption and import spending increase from $650 billion to $700 billion, while savings and taxes increase to $300 billion.
  - APC + APM = 700/1000 = 0.7
  - ART + APS = 300/1000 = 0.3

Savings, taxes, consumption and import spending all increase as national income rises. Notice, however, that the change in consumption and imports (from $600 billion to $700 billion) is less than the change in national income (from $650 billion to $1000 billion), while the change in savings and taxes ($50 billion to $300 billion) is greater than the change in consumption and import spending.

In this example, as national income rises from $650 billion to $1000 billion, consumption and imports increase by a smaller amount, from $600 billion to $700 billion. Assume that of this $100 billion increase, $20 billion went towards the purchase of imports and $80 billion towards the purchase of domestic output. Knowing the changes in consumption and imports resulting from a change in national income, we can determine the marginal propensity to consume (MPC) and the marginal propensity to import (MPM).

$$\text{MPC} = \frac{\Delta C}{\Delta Y} = \frac{80}{350} = 0.23$$

23% of the $350 billion increase in national income went towards the consumption of domestically produced goods and services. The MPM is the change in import spending divided by the change in income, so:

$$\text{MPM} = \frac{\Delta M}{\Delta Y} = \frac{20}{350} = 0.057$$

5.7% of the $350 billion increase in income went towards the purchase of imported goods and services.

Economic theory suggests that savings should increase as a proportion of income as income rises. However, recent data from some developed nations have suggested otherwise. Throughout the 1990s and early 2000s, for instance, US national income grew at an average rate of 3.5% per year (a healthy growth rate) but during the same period, savings rates fell to historic lows. In the face of rising incomes, households may become overly optimistic about the future and consumers spend beyond their means by accumulating large debts. On a nationwide level, this can result in negative savings rates.

Next, we can determine the marginal propensity to save (MPS) and the marginal propensity to tax (MPT).

Assume that of the $250 billion increase in savings and taxes, $100 billion went towards taxes, and savings increased by $150 billion. Now we can determine the proportion of the change in national income of $350 billion that went towards paying taxes and savings.

The MPS is the change in savings divided by the change in income, so:

$$\text{MPS} = \frac{\Delta S}{\Delta Y} = \frac{150}{350} = 0.429$$

42.9% of the increase in national income from $650 billion to $1000 billion went towards increased savings among the nations households. Taxes also increased.

The MPT is the change in taxes divided by the change in income, so:

$$\text{MPT} = \frac{\Delta T}{\Delta Y} = \frac{100}{350} = 0.286$$

28.6% of the increase in national income went towards taxes collected by the government. Notice that at higher income levels, the level of savings and taxes increases as a percentage of total income, while the level of household consumption actually decreases as a percentage of total income. Saving, it could be argued, is a luxury enjoyed more by nations with high incomes than those at low incomes. Simply put, high-income households are inclined to save more of their income than low-income households.

Since consumption, saving, paying taxes and purchasing imports are the only things a nation's households can do with an increase in national income, then the sum of MPC, MPS, MPT and MPM must equal one.

MPC + MPS + MPT + MPM = 1

In our example: 0.23 + 0.057 + 0.429 + 0.286 = 1.

You will recall from Chapter 11 that in the circular flow model, taxes, savings and the purchase of imports are considered leakages since these activities do not contribute to the creation of jobs or growth in the domestic economy. The MPS, MPT and MPM together are therefore sometimes referred to the marginal rate of leakage (MRL).

MRL = MPS + MPT + MPM

Although the level of income of the nation's households is the primary determinant of consumption in a nation, it is not the only one. The level of consumption in a nation can increase or decrease depending on other, non-income determinants of consumption.

Marginal propensities to consume, save, tax and import (MPC, MPS, MPT and MPM) measure the proportion of a change in household income that is used to consume domestic output, saved by households, paid in taxes and used to purchase imports, respectively.

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## Non-income determinants of consumption

These include the wealth of households, real interest rates, the level of household debt, household expectations and consumer confidence.

### Wealth

In addition to income, the level of wealth among households determines the level of consumption. Wealth is defined as the net worth of an individual or a household including the value of all its assets minus all its liabilities. A household's assets may include real assets (such as the value of a house or stock in companies) or financial assets (such as the value of money in savings or retirement accounts). When either real wealth or perceived wealth increases, household consumption tends to increase. Households perceive themselves as being richer when the value of the home rises or stock prices rise, leading to a higher level of consumption even if disposable income remains constant. This is why wealth is a non-income determinant of consumption.

Figure 12.5 shows the relationship between house prices and consumption in the UK from 1975 to 2004. The dotted red line shows the percentage change in household spending on goods and services year on year (left-hand scale) and the solid blue line shows the percentage change in house prices year on year (right-hand scale).

Wealth is the total value of the accumulated assets owned by an individual, household, community or country, minus all its liabilities. The wealthier a nation's households, the greater level of consumption. Wealth differs from income, because it does not measure the money flowing to households from their provision of land, labour and capital in the resource market; it measures the value of assets accumulated over time.

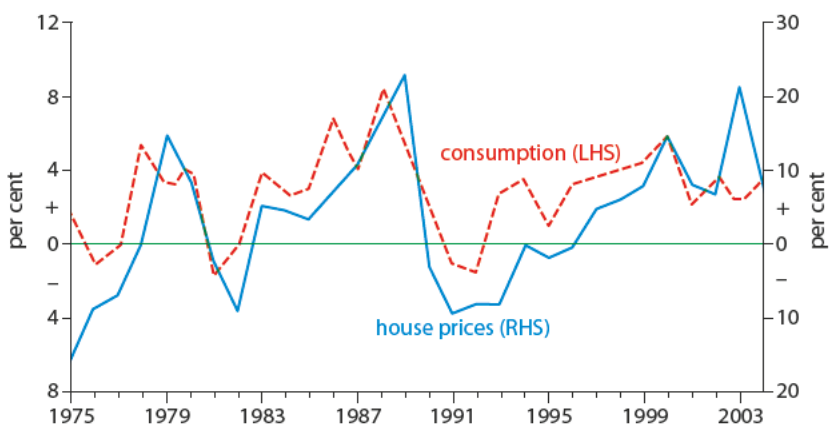


**Figure 12.5**
Household wealth is an important determinant of consumption.

O Attanasio, L Blow, R Hamilton, A Leicester, *Consumption, house prices and expectations.* September 2005, Bank of England

Wealth is not real or tangible insofar as it represents an abstract concept. To what extent are human behaviours dictated by abstract concepts such as wealth? If you were suddenly told that you were wealthy, would you change your behaviour?

There is a strong correlation between the two curves in Figure 12.5. In years in which house prices increased, consumption almost always increased with it. In years in which house prices fell, so did consumption. Homes are a physical asset that make up a large proportion of many households' wealth, therefore an increase in house prices makes households feel wealthier and leads to more consumption at every level of income. Graphically, this would be illustrated as an upward shift of the consumption curve.

Besides house prices, changes in the values of other assets such as stocks and bonds affect household consumption. A slump in the stock market is likely to decrease consumption and increase savings even as incomes remain unchanged. Likewise, a rise in stock prices makes households feel richer and results in greater consumption at all levels of income.

## Real interest rates

The interest rate is the opportunity cost of spending money. If firms or households borrow money to finance spending on capital or land, the interest rate is the price they must pay above and beyond the amount borrowed to the bank. Therefore, there is an inverse relationship between the interest rate in a nation and the quantity of funds demanded for investment and consumption.

Consumption of durable goods is interest sensitive, since households sometimes finance the purchase of 'big-ticket items' (automobiles, household appliances, computers, televisions, etc.) through borrowing. Households respond to higher real interest rates by decreasing their consumption of these non-essential items since it becomes more costly to borrow when interest rates rise.

Real interest rates are determined by taking the nominal interest rate (i.e. the actual percentage charged by banks for a loan) and subtracting the rate of inflation. For instance, a nominal interest rate of 5% in a situation where unanticipated inflation is 2% equates to a real interest rate of 3%. Households consider the real rate of interest when deciding to purchase durable goods requiring financing.

If inflation is anticipated, banks will charge higher nominal interest rates to borrowers. Therefore, anticipated inflation has little or no effect on the real interest rate and consumption. Nominal interest rates rise with anticipated inflation as banks must charge higher nominal rates to maintain their profits, since inflation erodes the value of money and a borrower would be paying back money worth less than the money borrowed if nominal rates were not increased. However, if there is unanticipated inflation or inflation greater than that anticipated by banks and incorporated into the rate charged to borrowers, then the real interest rate will be reduced and households induced to spend on durable goods. This is because the opportunity cost of holding money (inflation rate) increases while the opportunity cost of spending money (nominal interest rate) remains the same.

During periods of unanticipated inflation, the real interest rate falls and households are more likely to consume more at every level of income. If there is unanticipated deflation (a decrease in the price level), then the real interest rate rises and, since households would now have to repay loans with money worth more than that borrowed, the incentive is to save more and decrease consumption. A rise in real interest rates caused by a decrease in the price level results in less consumption at each level of household income.

## Household debt and expectations of future income

The level of household debt can shift the consumption curve upwards or downwards. Household debt is the amount of money owed by a household to lenders, including consumer debt accrued through the use of credit cards or by borrowing from a bank to finance consumption of durable goods. In the short run, an increase in consumer debt allows households to increase consumption at each level of household income. But in the long run, debts must be paid back, which is only achieved through reductions in future consumption as household income must go towards repaying past debts.

Increases in household debt allow households to consume beyond their income limit but ultimately require a decrease in consumption when debts must be paid back. The degree to which access to credit and the corresponding increase in household debt actually affects consumption depends on the expectations among households of future income. When expectation of future household income is raised, households are more willing to take on debt to finance current consumption, increasing consumption at all levels of current income. If, on the other hand, households expect future incomes to fall, the willingness to incur debts to finance current consumption declines and households shift their focus to paying off past debts in anticipation of harder economic times ahead.

National debt refers to the debts held by government. Increasing the national debt by deficit spending allows a government to spend more on goods and services than it collects in tax revenue. Government spending is a separate component of AD, but the concept of national debt and household debt are similar in that they both allow for spending beyond the level of current income.

You will probably soon receive your first credit card offer in the mail. While the temptation to spend this 'plastic money' is often strong in the present, any spending you do now must be repaid in the future. A credit card allows you to spend *more than* your income level now, but ultimately you'll have to consume far less in the future, as you begin to pay off the debt.

## Consumer confidence

John Maynard Keynes used the term 'animal spirits' to describe the confidence (or lack of confidence) among households and firms in an economy. Consumer confidence is an economic indicator that measures the degree of optimism that consumers feel about the overall state of the economy, and is therefore an important determinant of overall household consumption. During periods of economic growth with low unemployment and stable prices, confidence tends to be high and consumer spending strong. In periods of macroeconomic uncertainty, when overall output is falling, unemployment is rising and prices are declining, consumer confidence can collapse and households will reduce their consumption and increase savings in expectation of future economic hardships.

A change in any of the determinants of consumption above will increase or decrease consumption at all levels of income (Figure 12.6).

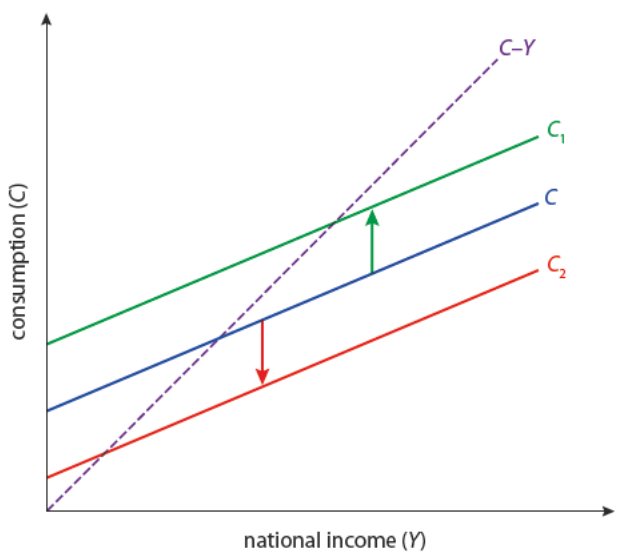


**Figure 12.6**
A change in the determinants of consumption will shift the consumption curve up or down.

The line $C$ in Figure 12.6 represents consumption. An increase in household wealth, a decrease in real interest rates, an increase in indebtedness or an improvement in consumer confidence will all shift the consumption curve from $C$ to $C_1$. On the other hand, if wealth declines, real interest rates rise, households begin to pay off past debts or consumer confidence falls, consumption will decrease from $C$ to $C_2$. The determinants of

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consumption are the non-income factors that can shift the overall level of consumption among a nation's households.

## Determinants of investment (*I*)

Investment is the second component of a nation's AD. Investment is defined as spending by firms on capital equipment or technology and by households on newly built homes.

Look again at Figure 12.2, which shows the components of AD in several countries. It can be seen that in most of the countries represented, investment made up approximately 20% of the nation's total demand. The one exception is Vietnam, where investment made up around 45% of the country's total spending on goods and services. It is not uncharacteristic for less developed countries such as Vietnam to have high levels of private investment relative to other components of aggregate demand.

In 2009, 45.9% of China's total spending was investment by firms. Countries such as China and Vietnam (in which economic growth is based on manufacturing) are more likely to experience higher levels of investment (as their private sectors expand to meet the growing demands of both domestic and foreign consumers) than the more developed, industrialized countries in which capital is already relatively abundant.

### Interest rates

The level of investment by firms in an economy is determined primarily by the real interest rate. The interest rate is the opportunity cost of spending money.

At higher interest rates, the amount of investment in the economy declines for the following reasons.

- Firms have an incentive to save earnings from the sale of their output, as the returns on savings are higher. Firms, always the profit-maximizers, will be less likely to invest in capital when returns are greater on investments in interest-earning assets such as savings accounts and government bonds.
- Higher interest rates mean greater returns on household savings, so households prefer to keep their money in banks or other interest-bearing assets rather than investing in capital or new homes.
- At higher interest rates, the cost of borrowing to finance capital investments is greater. Since interest payments add to a firm's costs, higher interest rates mean higher costs and smaller profits.
- There are fewer investments in capital with an expected rate of return equal to or greater than the rate of interest.

At lower real interest rates, the amount of investment in the economy increases for the following reasons.

- The opportunity cost of buying new capital falls and firms are more likely to invest revenues earned from their sales in new capital equipment in order to expand their output or simply to replace deteriorating capital stocks.
- The returns on interest-bearing assets such as savings accounts and government bonds fall when interest rates are low, so there is less incentive to save earnings. Households are less willing to save and more willing to borrow to invest in new homes when interest rates are low.
- The cost of borrowing to finance investments in new capital or technology is lower.
- More capital investments have an expected rate of return equal to or greater than a lower interest rate than when interest rates are high.

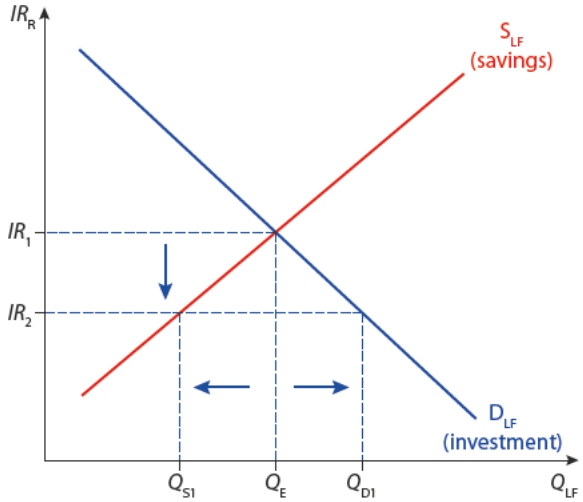



**Figure 12.7**
The loanable funds market diagram.

There is an inverse relationship between the real interest rate in the economy and the demand for funds for private investment and a direct relationship between real interest rate and the supply of loanable funds. This relationship can be illustrated in a diagram known as the loanable funds market diagram (Figure 12.7 above).

At the higher interest rate of $IR_1$ the supply of funds provided by households is equal to the demand from firms and households for investment; the loanable funds market is in equilibrium. However, if the interest rate were lower, at $IR_2$, the quantity of funds demanded for investment would increase, since there are far more investments in capital and technology with an expected rate of return high enough to cover the interest payments. Notice, however, that at a lower interest rate, households are willing to save less money in banks, and the quantity supplied is less than the quantity demanded (a shortage of loanable funds). At $IR_2$ the loanable funds market is in disequilibrium, since there is a greater demand for investment than there is a supply of funds available.

Assume that $IR_1$ is 8%. A firm willing and able to borrow at 8% must expect to make a return on that investment of at least 8%. Otherwise, with an expected rate of return of less than 8%, borrowing and investing would add more to the firm's costs than to its revenues and lead to economic losses.

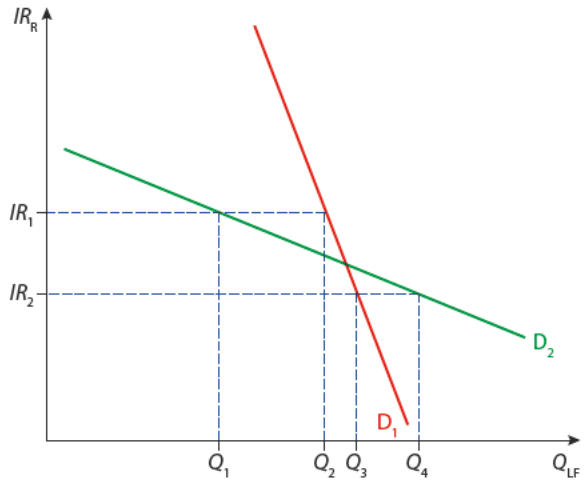
Assume $IR_2$ is 4%. At this lower interest rate, there are far more investments in capital and technology with an expected rate of return high enough to cover the interest payments of 4%. Since more investments are likely to pay a return greater than 4% than 8%, the quantity of funds demanded for private investment increases as the real interest rate decreases.

Lower interest rates will lead to greater investment as long as firms are responsive to changes in the interest rate. This fact will play an important role in later chapters when we examine the policy options available to governments and central banks for managing the level of AD in a country. Monetary policy involves the manipulation of a nation's money supply by its central bank with the goal of affecting interest rates and stimulating or contracting private investment in capital, thus affecting the overall level of demand in an economy.

If firms are relatively unresponsive to changes in the interest rate, then policies that raise or lower the interest rate will have little effect on the demand for funds for investment. In other words, the demand for loanable funds for investment can be relatively elastic or it can be relatively inelastic (Figure 12.8, overleaf).

In Figure 12.8, when demand for loanable funds is $D_1$, a decrease in the interest rate from

**Figure 12.8**
The demand for loanable funds can be relatively elastic or inelastic.




The loanable funds market is a hypothetical market that shows the relationship between the real interest rate in a country and the supply of and demand for money from households and firms for private investment. In equilibrium, the quantity supplied by households (who save money in commercial banks) and demanded by firms (who borrow from banks to finance capital spending) are equal.

$IR_1$ to $IR_2$ leads to a very small increase in the demand for funds for investment, from $Q_2$ to $Q_3$. Demand for investment funds is highly inelastic (i.e. unresponsive to changes in the interest rate). With an investment demand of $D_2$, however, a fall in the interest rate from $IR_1$ to $IR_2$ leads to a proportionally larger increase in the quantity of funds demanded by firms for investment in new capital, from $Q_1$ to $Q_4$.

## Business confidence

In addition to the real interest rate, investment in the private sector also depends on the expectations of firms, or Keynes's animal spirits. If firms are feeling confident, both about their future sales outlook and that the price of their output will be higher in the future, then they are more likely to invest now.

Investor confidence is directly influenced by consumer confidence. As we learned from the circular flow model (page 236), firms and households in a market economy are totally interdependent. The well-being of firms depends on the demand for their output among consumers. If consumption is falling, investment will fall as well. Less investment reduces firms' demand for capital and labour, leading to higher unemployment and further declines in disposable income and consumption. Such a slump in AD is the most common cause of a recession, a macroeconomic condition in which total output of a nation declines, unemployment rises and price levels fall.

In addition to their expectations of future consumer demand for their products, firms must also consider other factors when deciding whether or not to invest.

### Future prices

If there is deflation in a nation (decrease in the average price of goods and services), firms are more likely to save their revenues and postpone investments until prices start to rise again. If prices are rising, however, firms will wish to invest now to take advantage of the higher prices they will be able to sell their output for in the future.

### Technology

New technologies often lead to periods of increased investment by firms adopting the technology or providing goods and services to consumers that incorporate the new technology. One of the best examples of this is the period following the invention of the world wide web in the mid-1990s when households began to gain wide access to the internet. The dot-com boom of the late 90s saw trillions of dollars in new investments in

companies which were formed to meet the growing demands of households connected to the internet. Consumer technologies such as smartphones, tablet computers and mobile global positioning systems (GPS) have triggered new markets for firms to invest in. Additionally, technologies that increase productivity in production of traditional consumer goods (e.g. robots that make automobiles; chemical fertilizers and pesticides that increase agricultural productivity; other mechanical and industrial techniques of production) may induce periods of investment by firms.

As it turned out, the dot-com boom of the 1990s ended in a bust as the value of internet-based companies plunged by $5 trillion between 2000 and 2002. The dot-com bubble, as it has become known, was the result of a huge over-investment in a sector of the economy that would ultimately be much less lucrative than investors originally thought it would.

### Business taxes

An increase in tax on profits or on investment reduces demand for funds for investment at all interest rates because firms have less incentive to acquire new capital when the government takes a larger share of the returns. Even the expectations of higher taxes in the future affect firms' behaviour in the present. When a government builds up a large national debt by spending more than it collects in tax revenues, business owners may be hesitant to invest if they suspect the government may increase taxes down the road to reduce the deficit and pay off the national debt.

### Inventories

When businesses are unable to sell all the output they produced in a given period of time, their inventories grow and this reduces the need to invest in new capital. Inventory investment is the difference between what is produced in a year and what is sold in the same year. If firms expect there to be a greater need for inventories in a given year (in other words, if they expect past inventories to dwindle because of strong demand), then they invest in new capital to add to their inventories to meet the expected demand from consumers. However, if inventories are growing and expected to continue to grow, firms reduce investment now in the hope of selling off existing inventories before contributing to their already growing stock of unsold output.

### The degree of excess capacity

If firms can easily increase output because they are producing below their full capacity, they are less likely to invest in new capital now. However, if a nation's firms are using existing capital resources at or near their full capacity, the need for investment to replace old capital or expand existing capital is greater.

Business confidence is a contributing factor to the level of AD. What knowledge issues arise in attempting to measure business confidence?

The expectations that firms hold of future business conditions are of great importance in determining firms' willingness to invest. During the recession of 2008–09 in Europe and the US, interest rates fell to almost 0% in many countries yet private sector investment seemed completely unresponsive to the low costs of borrowing. The lack of confidence among households and firms around the world helps explain why the low interest rates failed to spur new investment and jump-start the stagnant economies of the world during these difficult years.

To learn more about investment, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 12.3.

When business confidence is low, it is extremely difficult to turn things around in a struggling economy. In later chapters, we examine the policy tools a government or central bank might implement to stimulate AD when a nation's households' and firms' confidence about the future prevents the private sector from sufficiently contributing to the nation's AD to keep employment and output strong.

## Determinants of government spending (*G*)

Government spending includes a broad range of expenditure: public schools and universities, national defence, highways and roads, parks and hospitals. Governments may

spend directly on the provision of goods and services or may subsidize their provision by the private sector. Government spending makes up a huge range of total AD across nations. As you saw in Figure 12.2, government spending makes up the largest proportion of the economies of Northern and Western European nations such as Denmark, Sweden, the Netherlands, France and Germany. In these countries, government provides services such as healthcare and education to all citizens, paid for almost entirely by taxpayers.

In countries with large government sectors, taxes on households and firms tend to be much higher than in those where government spending makes up a smaller proportion of AD. This makes sense since ultimately all government spending on goods and services must be financed by the nation's taxpayers.

The level of government spending in a nation in a particular year depends on the government's fiscal policy, which refers to the government's use of taxes and spending to stimulate or contract the overall level of AD in an economy. Fiscal policy is explained in detail in Chapter 17, but what you need to know here is that its use can raise or lower the level of government spending in a given period to help meet the macroeconomic objectives of full employment, price stability and economic growth.

## Determinants of net exports ($X - M$)

Expenditure on a nation's output includes spending by domestic households ($C$) and domestic firms ($I$), but also foreign households and firms. In a global economy, nearly every nation depends to some degree on foreign demand for its output as a component of its GDP. Net exports measures the spending by foreigners on a nation's goods and services minus the amount spent by domestic households and firms on imports from other countries. Net exports is, therefore, the only component of AD that can be negative, which occurs when a nation spends more on imports than it earns from the sale of its exports.

Of the countries whose components of AD are shown in Figure 12.2 (page 259), eight (most prominently Georgia) had negative net exports, meaning they spent more on imports from the rest of the world than the rest of the world spent on their goods and services. In 2009, the total GDP in the US was around $14 trillion; Americans spent $450 billion more on other countries' output than foreigners spent on theirs. America's net exports of –$450 billion contributed –3% to America's GDP. In contrast, Germany's net exports were around $200 billion in 2009, meaning German firms sold $200 billion more to the rest of the world than German households consumed of foreign goods and services. Net exports accounted for 4.8% of Germany's total output in 2009.

**● Examiner's hint**

The key thing to remember about net exports is the *net* part of the term. Exports may be a huge part of a nation's economy, but account for only a tiny percentage of its GDP. Switzerland, for example, exports goods and services with a value of roughly 70% of Swiss GDP. But since it also imports vast amounts, Switzerland's *net* exports account for only about 5% of its GDP. Switzerland still earns more from its exports than it spends on imports, but the large value of its exports is offset by the nearly equally large expenditure on imports.

### Incomes abroad

The macroeconomic health and households' incomes of a nation's trading partners determine demand for the nation's exports. For example, Canada's largest trading partner is the US (75% of Canada's trade takes place with the US). As incomes in the US fell during the recession of 2008–09, Canada's exports fell from $460 billion in 2008 to $323 billion in 2009, a decline of 30%. However, during the same period, Canada's imports from the rest of the world also declined, from $415 billion to $327 billion, a decline of 21%. Canada's net exports in 2008 were $44 billion but in 2009 fell to –$4 billion, a decline of $48 billion in one year. Falling incomes in the US are the most likely explanation for this massive decline in Canada's net exports, supporting the fact that household income in trading nations is a major determinant of a nation's net exports.

## Tastes and preferences of consumers

Some countries just do it better. German cars are known around the world for craftsmanship and quality. Among discerning consumers, Swiss watches will always be preferred over cheap ones made in China. The Japanese always seem to be on the cutting edge of home entertainment technologies (e.g. the PlayStation and Sony's 3D TVs). The taste of consumers is a major determinant of a country's exports. Once a country's producers have developed a strong reputation in the global marketplace, that country can count on steady demand from abroad for its output. Creating demand abroad for a nation's goods and services is an important objective of any government's diplomatic missions and the marketing departments of countless multinational corporations.

## Exchange rates

An exchange rate is simply the price of a currency expressed in units of another currency. While a strong currency may sound desirable, in fact a weak currency is more likely to contribute to a country's net exports. A weaker currency makes the output of a country's producers cheaper to consumers abroad, whose own currency is relatively strong. Governments often take measures to intervene in foreign exchange markets to devalue or depreciate their currencies relative to others in order to help their domestic producers compete in the global market and to stimulate AD by shifting the balance of the country's net exports towards the positive. A weaker currency also makes foreign products less desirable to domestic consumers and may also lead to a growth in domestic household consumption. In contrast, a strong currency reduces demand for a country's output abroad and increases the attractiveness of foreign products among domestic households, shifting a country's net exports towards the negative. Exchange rates are discussed in Chapter 22.

## Protectionism

The degree to which a nation and its trading partners practise protectionism affects what percentage of its GDP is made up of net exports. If a nation chooses to erect high barriers to trade such as tariffs, quotas, or subsidies to domestic producers, it may experience retaliatory protectionism from countries with which it trades and, over time, the percentage of its AD accounted for by net exports will decline. Protectionism is discussed in Chapter 22.

To learn more about exports, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 12.4.

# Causes of shifts in the AD curve

A change in any of the components of AD leads to a shift in the AD curve, meaning that, at a given price level, either a larger or a smaller amount of total output in a nation is demanded (Figure 12.9, overleaf).

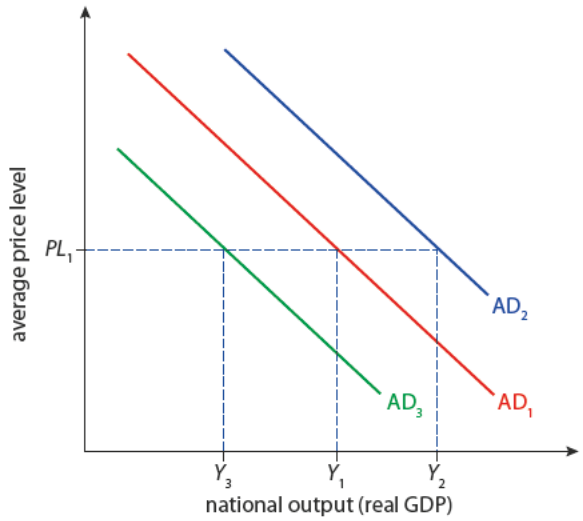
An increase in either consumption, investment, net exports or government spending in a nation shifts the AD curve in Figure 12.9 from $AD_1$ to $AD_2$, increasing the output of the nation demanded at $PL_1$ to $Y_2$. A fall in consumption, investment, net exports or government spending shifts AD from $AD_1$ to $AD_3$, reducing the amount of output demanded at $PL_1$ from $Y_1$ to $Y_3$.

A nation's aggregate demand increases whenever households, firms, foreigners or the government increase their spending, and falls when spending falls. In this regard, the aggregate demand of a nation is the sum of the total expenditures by the private and public sectors on the nation's output. This method of measuring is called the expenditures method for measuring AD:

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

To access Worksheet 12.1 on America in the recession, please visit www.pearsonbacconline.com and follow the onscreen instructions.

**Figure 12.9**
AD shifts when any of the components of AD change.




## 12.4 The Keynesian spending multiplier

Learning outcomes

- Explain, with reference to the concepts of leakages (withdrawals) and injections, the nature and importance of the Keynesian multiplier.
- Calculate the multiplier using either of the following formulae.

  $$\frac{1}{(1 - \text{MPC})}$$

  or

  $$\frac{1}{(\text{MPS} + \text{MPT} + \text{MPM})}$$

- Use the multiplier to calculate the effect on GDP of a change in an injection in investment, government spending or exports.

The existence of the Keynesian spending multiplier has been the topic of fierce debate in recent years. Following America's Reinvestment and Recovery Act (the 'Obama stimulus') of 2009, economists attempted to measure the multiplier effect of an $800 billion increase in government spending. Their findings were widely varied, and some economists determined that the multiplier could be negative (i.e. an $800 billion increase in government spending could lead to an increase in national income of *less than* $800 billion).

Understanding how a particular injection of national income will ultimately affect a nation's GDP requires us to examine the proportion of the injection that is leaked from the circular flow relative to the amount that continues to circulate in the economy, creating additional income and employment for the nation's households.

One tool of fiscal policy is the use of government spending ($G$, a component of a nation's AD) to promote the macroeconomic objectives of full employment and economic growth. If the government increases its spending, or if any of the other external components ($I$, investment or $(X - M)$, net exports ) of AD increase, it is possible to estimate the ultimate effect on national income if we know the value of the Keynesian spending multiplier.

The Keynesian spending multiplier tells us the amount by which a particular injection of government spending, investment, or export spending will ultimately increase the nation's total GDP. The larger the proportion of the initial change in income that goes towards consumption, the larger the ultimate change in GDP will be following an initial increase in aggregate demand. Therefore, the spending multiplier ($k$) is a function of the marginal propensity to consume, and is determined using the following formula:

$$k = \frac{1}{(1 - \text{MPC})} \text{ or } k = \frac{1}{\text{MRL}}$$

You will recall that MPC + MPS + MPT + MPM = 1 and that MRL = MPS + MPT + MPM (page 263). It follows that 1 – MPC = MRL.

The larger the marginal propensity to consume in a nation, the larger the spending multiplier, and the greater the ultimate effect of initial increase in spending on total GDP.

Let's consider two examples.

### Worked example

- In country A, 50% of a change in income goes towards consumption of domestic goods and services. Country A's MPC is 0.5.
- In country B, 80% of any increase in income goes towards consumption. Country B's MPC is 0.8.

To determine the effect of an increase in spending of $10 billion in these two countries, we must determine the spending multiplier ($k$) in both countries.

In country A, the spending multiplier is:

$$k_A = \frac{1}{(1-0.5)} = 2$$

In country B, the spending multiplier is:

$$k_B = \frac{1}{(1-0.8)} = 5$$

With these figures, we can now estimate the effect of an increase in investment, government spending or exports of $10 billion. The ultimate change in GDP resulting from an initial change in expenditures ($E$) is:

$$\Delta GDP = k \times \Delta E$$

Assume for example, the governments of both countries are considering a fiscal policy involving an increase in government spending of $10 billion. With the spending multipliers known, we can determine the effect such a fiscal policy will have in both countries.

- In country A, $10 billion new income will ultimately result in an increase in GDP of $20 billion (10 billion × 2), since the initial change in income is multiplied through successive increases of consumption spending.
- In country B, where the MPC is greater (0.8), the same increase in government spending results in an ultimate increase in GDP of $50 billion (10 billion × 5).

Since country B's households spend a greater proportion of a change in income than country A's, the $10 billion fiscal policy will have a greater impact on country B's GDP than country A's. The larger the marginal propensity to consume, the greater impact a change in government spending, investment or exports will have on the level of national income in the country.

The concept of the Keynesian spending multiplier is explored in more depth in Chapter 17.

**EXERCISES**

**1** Between 2009 and 2010, Germany's national income increased by $100 billion. As a result:
- taxes increased by $20 billion
- household spending (on all goods, including imports) increased by $70 billion
- savings increased by $10 billion
- imports increased by $10 billion.

**a** Calculate the marginal propensities to consume, tax, save and import.
**b** Calculate the marginal rate of leakage.
**c** Calculate the value of the government spending multiplier.
**d** Calculate the ultimate effect on Germany's GDP of an increase in investment spending of $50 billion.

# 12.5 Aggregate supply and equilibrium national output

Learning outcomes

- Describe the term aggregate supply.
- Explain, using a diagram, why the short-run aggregate supply curve (SRAS curve) is upward sloping.
- Explain, using a diagram, how the AS curve in the short run (SRAS) can shift due to factors including changes in resource prices, changes in business taxes and subsidies and supply shocks.
- Explain, using a diagram, that the monetarist/new classical model of the long-run aggregate supply curve (LRAS) is vertical at the level of potential output (full employment output) because aggregate supply in the long run is independent of the price level.
- Explain, using a diagram, that the Keynesian model of the aggregate supply curve has three sections because of 'wage/price' downward inflexibility and different levels of spare capacity in the economy.

A nation's aggregate supply (AS) is the total amount of goods and services that all the firms in all the industries in a country will produce at every price level in a given period of time. The AS curve illustrates the relationship between the average price level in a nation and the total output of the nation's producers. There are competing theories on the possible response of a nation's producers to changes in the price level, depending on how prices and wages in an economy change following a change in AD. Therefore, we will examine two models of AS: the Keynesian AS curve, and the neo-classical AS curve (Figure 12.10).

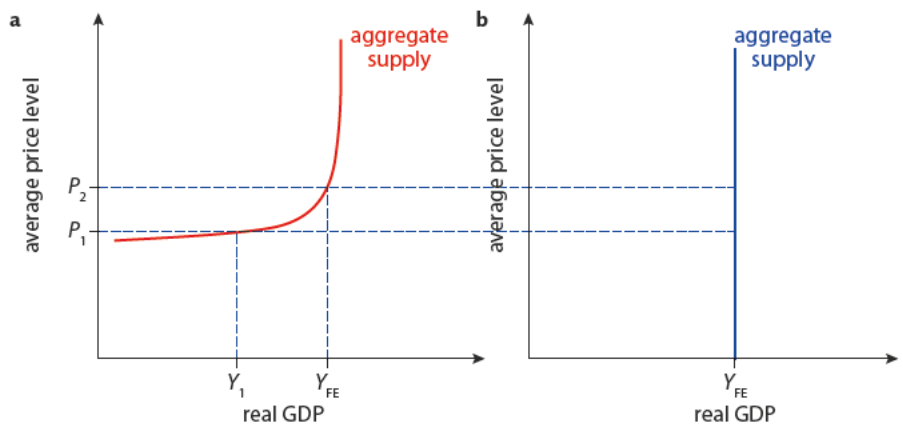



**Figure 12.10**
**a** The Keynesian aggregate supply curve; **b** the neo-classical aggregate supply curve.

The two aggregate supply curves in Figure 12.10 illustrate two different views of the responsiveness of a nation's producers to changes in the price level. Assume, for example, that the nation's price level starts at $P_1$. On the Keynesian AS curve, when the price level rises to $P_2$, producers are responsive to the higher price and increase their output from $Y_1$ to $Y_{FE}$ (i.e. full-employment output); in other words, AS is *relatively elastic* when the nation is producing at a relatively low level of output.

In the neo-classical model of aggregate supply, a change in the average price level of the nation's goods from $P_1$ to $P_2$ has no effect on the level of output. The neo-classical model assumes that regardless of the price level in a nation, the nation's producers will always

produce at the level of output at which all the nation's resources are fully employed. Aggregate supply is *perfectly inelastic* at the nation's full employment level of output.

For our purposes, we will use both the Keynesian and the neo-classical AS curves in our analysis. But rather than referring to them by these names, we will instead identify the Keynesian model as the short-run aggregate supply (SRAS) curve and the neo-classical model as the long-run aggregate supply (LRAS) curve. The two models can be combined with an AD curve to illustrate the changes in the equilibrium level of national output resulting (in both the short run and the long run) from a change in AD.

## Full employment national output

In the AS/AD model, $Y_{FE}$ refers the nation's full employment level of output, which is the level of output of goods and services achieved when a nation is producing at or near its potential by employing all available land, labour and capital. A nation achieving $Y_{FE}$ is producing either on or near its production possibilities curve, enjoys a low rate of unemployment and a stable price level and is, therefore, an economy that can be considered strong and healthy.

The LRAS curve is vertical at the full employment level of output, while the SRAS curve slopes upwards, but is highly elastic below full employment and becomes highly inelastic beyond full employment output.

To understand the theories of SRAS *vs* LRAS, two somewhat contradictory theories of how workers, producers and consumers respond to changes in the overall demand in an economy must be explained.

The Keynesian and neo-classical positions differ on the shape of the AS curve. What is needed to settle this question: empirical evidence (if so, what should be measured), strength of theoretical argument, or factors external to economics such as political conviction?

## 12.6 Short-run equilibrium in the AD/AS model: the Keynesian, sticky wage model

Learning outcomes

- Explain, using a diagram, the determination of short-run equilibrium, using the SRAS curve.
- Examine, using diagrams, the impacts of changes in short-run equilibrium.
- Explain, using the Keynesian AD/AS diagram, that the economy may be in equilibrium at any level of real output where AD intersects AS.
- Explain, using a diagram, that if the economy is in equilibrium at a level of real output below the full-employment level of output, then there is a deflationary (recessionary) gap.
- Discuss why, in contrast to the monetarist/new classical model, the economy can remain stuck in a deflationary (recessionary) gap in the Keynesian model.
- Explain, using a diagram, that if AD increases in the vertical section of the AS curve, then there is an inflationary gap.
- Discuss why, in contrast to the monetarist/new classical model, increases in aggregate demand in the Keynesian AD/AS model need not be inflationary, unless the economy is operating close to, or at, the level of full employment.

The SRAS curve is based on the theories of the early 20th-century economist John Maynard Keynes, whose work during the Great Depression forms the basis for many of our

modern macroeconomic theories. SRAS is generally upward-sloping, but the SRAS curve demonstrates two important characteristics that require further explanation:

- SRAS curve is horizontal (relatively elastic) at levels of output below full employment
- SRAS curve is vertical (relatively inelastic) at levels of output beyond full employment .

Both of these points reflect an important component of Keynesian macroeconomic theory.

## SRAS is horizontal at levels of output below full employment

In the short run, firms are very responsive to a decrease in the demand for national output. SRAS is relatively elastic when AD declines and the price level falls. A fall in AD will lead to a small decrease in the price level, but a relatively large decrease in total output (Figure 12.11).

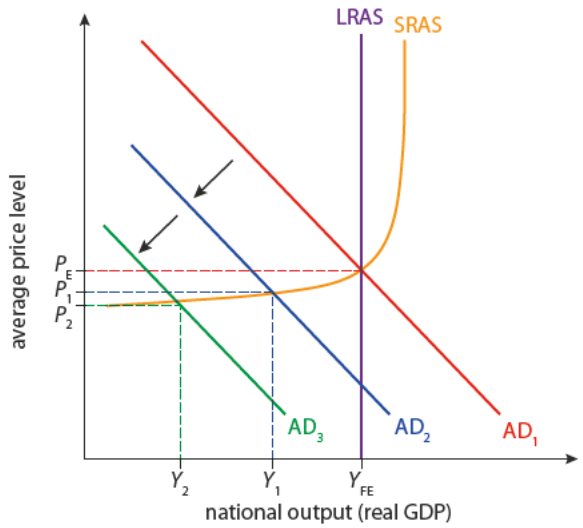



**Figure 12.11**
SRAS is highly elastic below the full-employment level of output.

Equilibrium national output is defined as the total output of goods and services by firms in a nation at a particular period of time at a particular price level. Equilibrium output is determined by the intersection of a nation's AD and AS. In Figure 12.1, there are three short-run equilibrium levels of output corresponding to three different levels of AD. They are as follows.

- **$Y_{FE}$**. When AD (i.e. $C + I + G + (X - M)$) is at $AD_1$, the equilibrium quantity of output is the full-employment level of output. At $Y_{FE}$ the nation experiences very low unemployment, stable prices (meaning low inflation), and the nation's resources are generally being used efficiently and near their full capacity towards the production of goods and services.
- **$Y_1$**. A decrease in AD from $AD_1$ to $AD_2$ (caused by a decrease in any of the components of AD) causes a fall in the price level from $P_E$ to $P_1$. As the average price level of goods in this economy fall, firms respond by reducing their output and laying off workers. In the short run, the decrease in the price level is proportionally smaller than the decrease in the equilibrium output.
- **$Y_2$**. If AD continues to fall to $AD_3$, firms must again reduce their employment and output. The result of a decrease in AD in the short run is, therefore, a fall in the price level and a fall in output. However, due to the highly elastic nature of SRAS below the full-employment level, the decline in output is proportionally greater than the decline in the price level.

The decline in the short-un equilibrium output and employment resulting from a fall in AD is explained by the fact that in the short run, wages and prices are downwardly inflexible. In macroeconomics, the short run is referred to as the fixed-wage period. Firms find it difficult or impossible to adjust workers' wages in the short run, due to several rigidities that exist in many countries' labour markets. Labour market rigidities that make wages inflexible in the short run include the following.

- **Worker contracts**. Workers in most industrialized nations sign contracts for periods of months or longer with their employers. A contract may include a guaranteed wage over the contract period; such legally binding agreements make it difficult for firms to simply slash wages in the face of falling demand for their products.
- **Minimum wage laws**. A minimum wage set by the government may make it difficult for employers of low-skilled workers or those in the service sector to reduce costs without laying off workers when demand falls. The existence of a minimum wage prevents the price level from adjusting downwards in times of weak AD and may cause unemployment to increase more than it otherwise would during periods of weak demand.
- **Wage agreements with labour unions**. Labour unions pose an obstacle to firms seeking to reduce costs as demand for their output falls. The threat of walk-outs or strikes by their unionized workforces prevents firms from slashing wages or benefits, in some cases forcing firms to shut down and lay off their entire workforce when overall demand is weak in the economy.
- **Government regulations**. Regulations mandating fair pay and fair treatment in the workplace make it difficult for firms to easily cut costs by slashing wages when demand is low.

Many of the institutions meant to protect workers (minimum wages, labour unions, contracts and government regulations) may harm workers, in that the rigidities they create could mean firms have to lay workers off during times of falling demand. Should such a claim be evidence enough to support the dismantling of such institutions? What other evidence is necessary before you can know whether worker protections are harmful to workers or not?

Because of the inflexible nature of wages in the short run, firms find it difficult to lower their prices quickly, and therefore must reduce output and lay off workers in response to falling demand.

Keynes's observations of the Great Depression included the fact that as total demand began to decline in the US and Europe in the early 1930s, the typical response of firms was to reduce employment and output, rather than slash wages and maintain their output at pre-depression levels. This observation actually makes sense to someone who has studied microeconomics, as in a market for a particular good or service a fall in demand leads firms to respond by reducing the quantity they supply and lowering their prices. In a nation as a whole, however, prices are slow to adjust in the short run due to the rigidities in a nation's labour market that make it difficult for firms to cut their costs quickly in response to falling demand. Therefore, a fall in AD leads to a fall in national output and only a small decrease in the price level in the short-run, fixed-wage period.

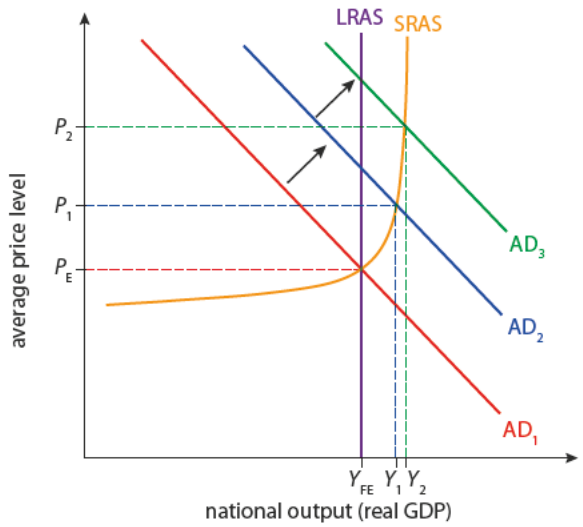
The SRAS curve, which shows the response of a nation's firms to a change in the price level during the fixed-wage period, is sometimes referred to as the sticky wage, sticky price model of AS. Since wages are relatively inflexible over a period of months following a change in AD, firms must respond to a decline in demand by reducing their output and laying off workers to reduce their costs and avoid having to shut down. In later chapters, we will apply the sticky wage, sticky price AS model to help us understand why unemployment reached its highest levels in decades in Europe and the US during the recession of 2008–09. Keynes's analysis of the rising unemployment experienced during the Great Depression of the 1930s seemed to help explain the doubling of unemployment in many countries over the last few years as well. For instance, while US unemployment increased from around 5% in 2007 to 10% by 2009, changes in the average price level over the same period were much less dramatic, as the US experienced inflation rates of between 0% and –2%.

Sticky wage / sticky price model is another name for the Keynesian, short-run aggregate supply curve. Because firms find it difficult to cut workers' wages in the short run, they must lay workers off to reduce costs, hence output and employment fall when AD falls in the short run.

## SRAS is vertical at levels of output beyond full employment

The inflexibility of wages in the short run also helps explain what happens following an increase in AD beyond the full-employment equilibrium level of output. In Figure 12.12, increases in either consumption, investment, government spending or net exports cause the AD curve to shift from $AD_1$ to $AD_2$ and then to $AD_3$, resulting in short-run equilibrium levels of output beyond the full-employment level ($Y_{FE}$).

**Figure 12.12**
SRAS is highly inelastic beyond the full employment level of output.




According to the SRAS model above, it is possible, in the short run at least, for a nation to produce beyond its full-employment level of output. Notice, however, that relatively small increases in output (from $Y_{FE}$ to $Y_1$ and then to $Y_2$) come at the cost of increasing inflation, as rising AD is met with an increase in the price level first from $P_E$ to $P_1$ and then from $P_1$ to $P_2$.

The inflexibility of wages in the short run helps explain the decreasing elasticity of SRAS beyond the full employment level of output. However, we must first address a point of confusion that students often express: how can a nation possibly produce beyond its full-employment level of output?

The full-employment level of output ($Y_{FE}$), represents the national output and income achieved by a nation when its resources are fully employed. This means that nearly all the nation's land, labour and capital are engaged in the production of goods and services. A nation achieving $Y_{FE}$ is producing on, or at least very close to, its PPC. However, producing at full employment does not mean that the nation has zero unemployment. In fact, a nation is said to be producing at full employment when the level of unemployment in the nation is low and stable, and the people who are unable to find work are generally in between jobs or have lost their jobs because of a mismatch of their skills with those that are in demand in the labour market. In other words, even when a nation is producing at full employment, there are still workers willing and able to work who are unemployed.

When AD increases from $AD_1$ to $AD_2$, firms wish to respond to the higher demand and the higher prices it brings by increasing their production. You will recall that in the short run, wages in the economy are fixed, therefore firms find it a bargain to hire more workers at the constant wage rate, since the rising prices promise greater profits for producers. However, as output grows, the number of workers available to hire begins to decrease and firms find they must compete for the increasingly limited supply of labour available. Therefore, output begins to increase at a decreasing rate when AD rises beyond the full-employment level.

As AD continues to increase to $AD_3$, further increases in output become almost impossible, as the economy is now producing beyond full employment, at nearly its full capacity level. Unemployment in the economy falls as AD increases, causing a tight labour market as firms find it harder to meet the rising demand from their customers. The result is a SRAS curve that is increasingly inelastic beyond the full-employment level of output, meaning that small increases in GDP are met with proportionally larger increases in the price level and inflation in the economy.

Keynes's view of the AS curve reflects the theory of sticky wages and prices in the short run. When AD falls, firms must reduce output and lay off workers since the existence of rigidities in the labour market makes it difficult to simply slash workers' wages in response to falling demand. Subsequently, when the total demand falls, output falls and unemployment rises in the short run, leading to a recession.

When AD rises, increases in output are proportionally smaller than the rise in the price level due to the rising demand for workers whose wages have yet to increase in response to higher demand for output. But because even a healthy nation producing at full employment has some unemployment, it is possible in the short run for a nation to achieve a level of output beyond full employment.

The Keynesian SRAS curve reflects the stickiness or inflexibility of wages in the short run by showing how a fall in demand leads to recession and high unemployment but only a slight deflation, while an increase in demand can lead to economic growth, reductions and unemployment, and ultimately inflation when output increases beyond the full-employment level.

Sometimes too much aggregate demand is a bad thing. China's economy grew at an annual rate averaging 10% between 2000 and 2010, fuelled mainly by high levels of investment and net exports. In 2011, in its most recent Five Year Plan, the Chinese Communist Party announced that it would attempt to lower the growth rate over the next five years to 7%. The inelastic nature of the SRAS curve beyond full employment helps explain why China wishes to slow the growth of its AD; too much demand leads to inflation, which would harm the Chinese people (Chapter 14).

## 12.7 Long-run equilibrium in the AD/AS model: the neo-classical, flexible wage model

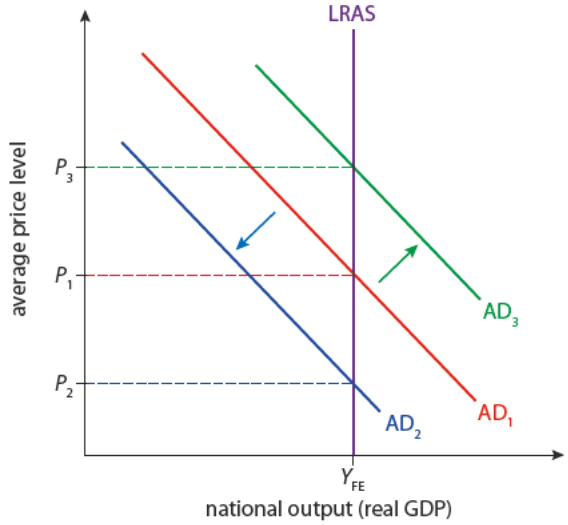
Learning outcomes

- Explain, using a diagram, the determination of long-run equilibrium, indicating that long-run equilibrium occurs at the full-employment level of output.
- Explain why, in the monetarist/new classical approach, while there may be short-term fluctuations in output, the economy will always return to the full-employment level of output in the long run.
- Examine, using diagrams, the impacts of changes in the long-run equilibrium.

In stark contrast to Keynes's interpretation of AS, the curve we identify as long-run aggregate supply (LRAS) illustrates a very different view of the macroeconomy. In the century leading up to the Great Depression, the prevailing view among economists known as the neo-classical school was that there was no relationship between the level of demand in an economy and the level of output. Rather, it was assumed that regardless of the total demand in a nation, the level of output would typically return to a level corresponding with the nation's production possibilities; in other words, output would always be at the full-employment level (Figure 12.13, overleaf).

The fundamental assumption behind the neo-classical view of AS is that wages and prices are perfectly flexible and will, therefore, adjust to the level of demand to ensure that output always remains at its full-employment level. There can be no involuntary unemployment, according to the neo-classical view, because workers who might lose their jobs as demand

**Figure 12.13**
LRAS is perfectly inelastic at the full employment level of output.




for the goods or services they produce declines will simply accept lower wages, which allows firms to maintain their output and employment while lowering their prices in response to declining demand.

While demand in an economy falls, the quantity of output remains steady because prices will adjust downwards to maintain the full-employment quantity. If workers are unwilling to work at the prevailing wage rates, then they are voluntarily unemployed, which in the neo-classical view is natural in an economy at any level of AD and, therefore, not of concern.

The neo-classical view of AS is highly unlikely to be realized in the short run because wages tend to be highly inflexible in the short run. However, over a period of months, or more likely years, the wages of workers in an economy are more likely to adjust in response to changes in AD. For this reason, we will generally apply the neo-classical, flexible-wage model of AS to our analysis of the long-run effects of a shift in AD, and use the model to illustrate LRAS.

For instance, in Figure 12.13 as AD falls from $AD_1$ to $AD_2$, in the short run, we would expect unemployment to rise, output to fall, and only a slight decrease in the price level (as in Figure 12.11, page 276). In the long run, as unemployment rises and demand remains weak, workers begin to accept the lower wages offered by firms in order to get back to work. Consequently, employment and output return to the full-employment level, while prices in the economy simply adjust downwards. When AD rises to $AD_3$, firms scramble to hire workers to increase their profits, but as labour markets tighten and workers become more scarce, there is upward pressure on wages. This means that firms must cut employment and reduce their output in response to the rising costs of production that higher wages cause. In the long run, therefore, output and employment return to $Y_{FE}$, and only the price level increases following a rise in AD.

The neo-classical, flexible-wage model of AS demonstrates that in the long run, there is no trade-off between the level of demand in an economy and the level of output. Changes in demand lead only to changes in the wage rate and the price level, as workers and consumers adjust their expectations and behaviour to the macroeconomic conditions in the nation.

To access Worksheet 12.2 on Hayek, Keynes and AS, please visit www.pearsonbacconline.com and follow the onscreen instructions.

Recessions, or periods during which a nation's output contracts and unemployment rises, are only likely if wages and prices are inflexible, in other words, in the short run. Assuming wages are flexible over time, then in the long run, the economy is able to self-correct from a recession as wages and prices adjust downwards and firms hire workers and increase their

output until the economy is producing at full employment once more. Likewise, long-run economic growth cannot be achieved by an increase in AD beyond the full-employment level because, over time, wages and prices adjust upwards increasing firms' costs and forcing them to reduce output and employment until the economy returns to its full-employment level of output.

To learn more about the AD/AS model, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 12.5.

## 12.8 Shifts in aggregate supply

Learning outcomes

- Explain, using the two models above, how factors leading to changes in the quantity and/or quality of factors of production (including improvements in efficiency, new technology, reductions in unemployment, and institutional changes) can shift the aggregate supply curve over the long term.

### Causes of an increase in AS

A change in the price level in a country resulting from a shift in AD causes a movement along the nation's AS curve. In the short run, a fall in AD causes a fall in output and a small decrease in the price level. In the long run, when wages have adjusted to the lower AD, the SRAS curve shifts to the right and output is restored at the full-employment level and at a lower price level (Figure 12.14).

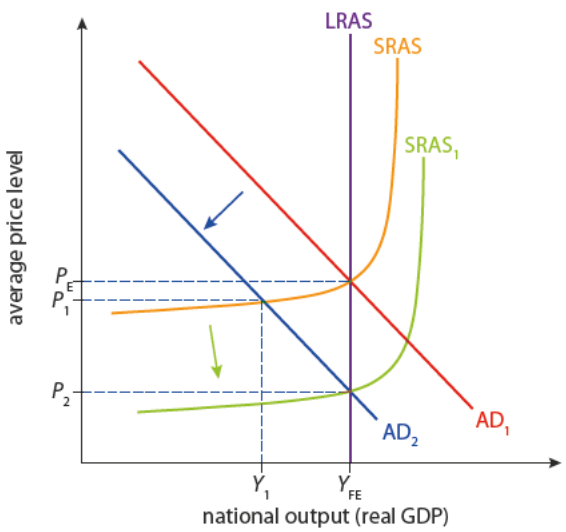



**Figure 12.14** SRAS shifts out when wages have had time to fall following a demand-deficient recession.

The SRAS curve shifts to the right only after the wage rate in the economy falls because of low demand for output and labour. Besides a change in the wage rate, other factors that can lead to an increase in SRAS include:

- lower resource costs (e.g. oil, minerals and other raw materials)
- improvement in the productivity of land or capital
- reduction in the minimum wage
- government subsidies to producers
- investment tax credits (encouraging firms to invest in capital)
- reduction in trade union power
- better infrastructure

- better educated or more skilled workforce (increases productivity of labour)
- stronger currency (makes imported resources cheaper).

An improvement in any of the above determinants of AS shifts the SRAS curve to the right, increasing the equilibrium level of output and putting downward pressure on prices in the economy. For an economy in a demand-deficient recession (Figure 12.14) an increase in SRAS does not necessarily increase LRAS, as the economy must return to full employment before its long-run level of output can expand.

If an economy is already producing at its full-employment level and any of the above determinants of SRAS improve, both the nation's SRAS and LRAS curves shift to the right, increasing the nation's full-employment level of output (Figure 12.15).

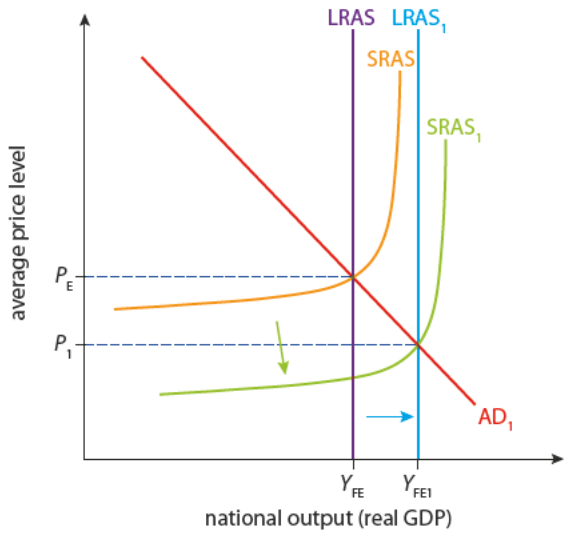



**Figure 12.15**
Increase in productivity or the quantity of a nation's resources shifts both SRAS and LRAS outwards.

Lower production costs for firms allow them to produce more goods and services and sell their product for lower prices, increasing the full-employment level of output and reducing long-term unemployment in the economy. Figure 12.15 illustrates economic growth resulting from more productive use of resources and lower production costs and an outward shift of AS.

## Causes of a decrease in SRAS

An increase in AD when an economy is already producing at full employment will result in inflation as the nation's output increases in the short run. In the long run, however, wages adjust upwards and the SRAS curve shifts to the left, restoring output at its full-employment level with more inflation in the economy (Figure 12.16).

SRAS shifts to the left in Figure 12.16 because wages increased in the economy following the demand-pull inflation resulting from an increase in AD from $AD_1$ to $AD_2$. In the long run (flexible-wage period), the economy returned to its full-employment level. Other factors that can reduce SRAS in a nation include:

- increase in resource costs (oil shocks, energy shortages, higher food prices)
- increase in trade union power
- increase in the minimum wage
- higher business taxes
- weaker currency (makes imported raw materials more expensive).

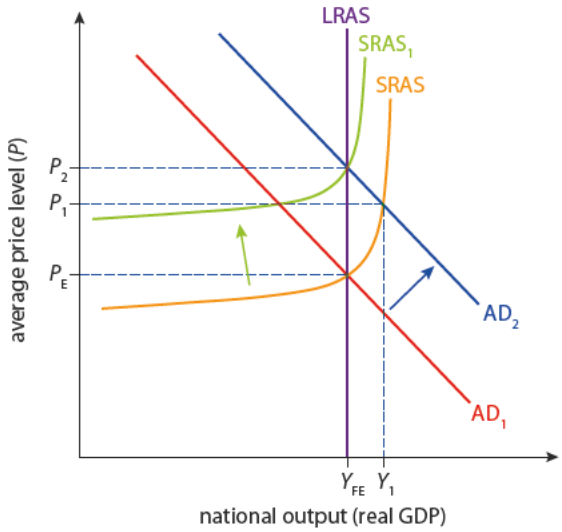



**Figure 12.16**
SRAS shifts inwards if wages and other resource costs rise during a period of demand-pull inflation.

If any of the above occur, a nation's SRAS curve shifts to the left, causing an increase in the price level and a fall in output (Figure 12.17). If the economy is producing at full employment and any of the above change, it will result in both a recession (a fall in national output) and inflation (caused by higher costs of production for firms).

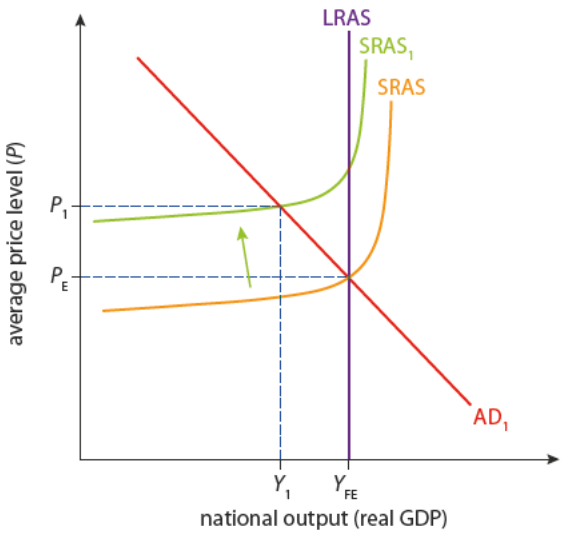



**Figure 12.17**
A supply shock causes SRAS to shift to the left, resulting in cost-push inflation.

In later chapters, we explore the policies governments can use to affect the overall supply of goods and services in a country. As we've seen, the willingness and ability of firms to produce goods and services at any given price level depends primarily on the costs of production. Factors that increase firms' production costs shift the SRAS to the left, reducing output and causing inflation, while lower costs of production or more productive resources shift AS to the right, with economic growth, and price stability or even deflation.

## The controversy over AS

Our use of two AS curves recognizes the validity of both the Keynesian view of the macroeconomy (wages and prices are relatively inflexible in the short run) and the neo-classical view (over time, wages adjust downwards or upwards in response to changes in demand and total output returns to the full-employment level). The implication, therefore, is that an economy in which AD falls will experience rising unemployment and a fall in

To access Worksheet 12.3, an exercise on aggregate demand and aggregate supply, please visit www.pearsonbacconline.com and follow the onscreen instructions.

output in the short run. However, if left alone, it will self-correct and output will return to the full-employment level in the long run. According to the neo-classical model, there is little need for a government to manage AD to maintain full employment, because an economy will always achieve full employment if the market is left to itself.

The debate over the shape of the AS curve has been going on for decades, and will likely continue long into the future. The reality is, whether AS is vertical, upward-sloping or horizontal depends on what nation is being discussed, the characteristics of that country's labour markets and the extent to which government is involved in the nation's economy. In the chapters that follow, the role of government in managing AD and AS is explored in more detail. In addition, the unprecedented shocks to the overall level of AD in the world's economies during the recession of 2008–09 is put into context and their effects on peoples' lives and the well-being of nations is explored.

Understanding the interactions of AD and AS in a nation's economy helps governments, households and firms to respond better to fluctuations in the level of economic activity, and gives all stakeholders involved the ability to understand the appropriate responses to periods of macroeconomic uncertainty or prosperity.

To access Quiz 12, an interactive, multiple-choice quiz on this chapter, please visit www.pearsonbacconline.com and follow the onscreen instructions.

## PRACTICE QUESTIONS

**1** **a** Use an AD/AS diagram to analyse the likely effects of an increase in interest rates. (10 marks) [AO2], [AO4]

**b** To what extent is the level of interest rates in an economy the primary factor businesses consider when making investment decisions? (15 marks) [AO3]



**2** **a** Use an AD/AS diagram to analyse the likely effects of an increase in income tax. (10 marks) [AO2], [AO4]

**b** Compare and contrast the levels of household consumption relative to total aggregate demand in countries with relatively high income taxes to those with relatively low income taxes. (15 marks) [AO3]



**3** **a** Using AD/AS diagrams, analyse the likely impact on an economy of the following:

**i** a general rise in wage costs

**ii** the discovery of new raw material sources

**iii** capital stock increases. (10 marks) [AO2], [AO4]

**b** Examine the likely effect of one of the events above on a nation's economy in the short run and in the long run. (15 marks) [AO3]



**4** **a** Identify the components of aggregate demand and briefly explain two factors which might determine each of these components. (10 marks) [AO2]

**b** Evaluate the likely impact on an economy of a substantial rise in the level of savings among the nation's households. (15 marks) [AO3]