

14

MACROECONOMIC OBJECTIVE:
LOW INFLATION

14.1

The meaning of inflation, disinflation and deflation**Learning outcomes**

- Distinguish between inflation, disinflation and deflation.
- Explain that inflation and deflation are typically measured by calculating a consumer price index (CPI), which measures the change in prices of a basket of goods and services consumed by the average household.
- Explain that different income earners may experience a different rate of inflation when their pattern of consumption is not accurately reflected by the CPI.
- Explain that inflation figures may not accurately reflect changes in consumption patterns and the quality of the products purchased.
- Explain that economists measure a core/underlying rate of inflation to eliminate the effect of sudden swings in the prices of food and oil, for example.
- Explain that a producer price index measuring changes in the prices of factors of production may be useful in predicting future inflation.
- (HL only) Construct a weighted price index, using a set of data provided.
- (HL only) Calculate the inflation rate from a set of data.

Definitions

Inflation erodes the value of money.

In addition to maintaining a low level of unemployment, national governments and central banks also focus their policies on the average price level of goods and services in a nation. Maintaining price level stability is considered a fundamental objective of macroeconomic policy, since price level instability can have negative effects on a nation's economic health.

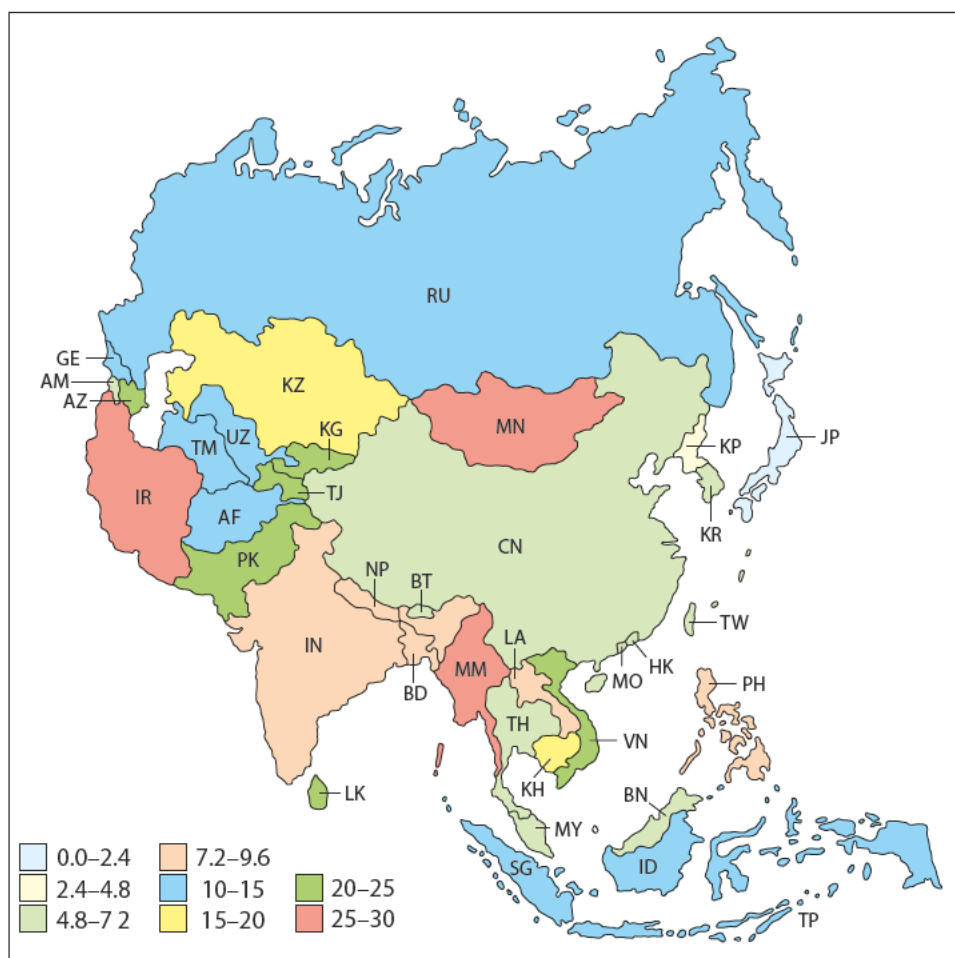


Inflation is defined as an increase in the average price level of goods and services in a nation over time (Figure 14.1). Deflation, on the other hand, occurs when the average price level of goods and services decreases over time. The key word in these definitions is *average* since inflation does not measure changes in the relative prices of particular goods. For instance, certain types of technology (e.g. MP3 players, cellphones and laptop computers) have come down in price considerably since their widespread adoption in the early 2000s. The fall in prices of these particular goods does not mean that nations have experienced deflation, since only certain types of good have become cheaper. Even as certain technologies have fallen in price, the overall price levels of most developed countries have risen over the last decade.



Figure 14.1

Inflation rates in Asia (2008).
www.indexmundi.com



Another way of understanding inflation is that it causes the value of money to decrease. An increase in the price level essentially makes money less valuable and reduces its purchasing power. In an environment of inflation, a particular amount of money will buy less in the future than it does in the present; thus inflation encourages households and firms to spend now rather than postponing spending until the future when prices are higher. The anticipation of future inflation can trigger a positive feedback loop in which households increase their spending now, thereby causing inflation and encouraging further increases in spending.

Deflation occurs when the average price level decreases over time. A fall in prices results in an increase in the value of money, since its purchasing power increases. A particular amount of money will buy more in the future than it does in the present when deflation occurs. Anticipated deflation incentivizes savings over current consumption and investment, since households and firms will wish to postpone purchases until the future when prices are expected to decline. Much as anticipated inflation can trigger an inflationary spiral, anticipated deflation can create a deflationary spiral in which spending falls, driving prices down, encouraging even less consumption and investment.

Disinflation refers to a decrease in the *rate of inflation*. You may find this term confusing at first, but its use should be clearer after you've done the exercises below.

Deflation is a decrease in the average price level of a nation's output.

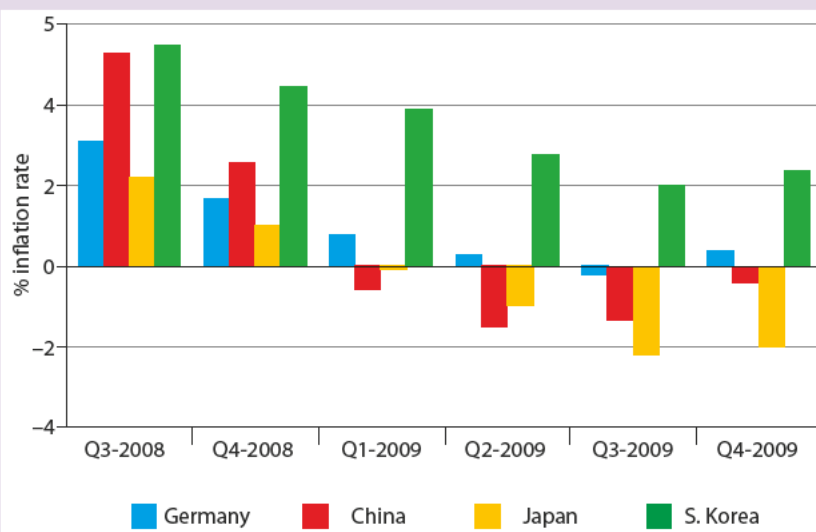
Disinflation is a decrease in the rate at which the average price level is rising (a decrease in the inflation rate).



Inflation is a sustained increase in the average price level of goods and services in a nation.

EXERCISES

- 1 Examine this graph which shows inflation in selected OECD countries, and answer the questions that follow.



stats.oecd.org

- In which countries was inflation highest throughout the period indicated?
- Which countries experienced deflation between 2008 and 2009?
- Over which quarters did Germany experience disinflation?
- How does the existence of high inflation affect households' decisions on whether to consume or save?

Measuring inflation using a price index

Changes in price levels in nations are monitored on a monthly or quarterly basis in all 30 OECD nations. The methods for collecting inflation data are similar across countries, and employ a tool known as a price index. A price index is a relatively straightforward measure estimating the average price of goods and services purchased by households and firms within a region or nation. Calculating a price index involves the government conducting a regular survey of the prices of hundreds or even thousands of different consumer and producer goods.

The consumer price index (CPI) measures the prices of consumer goods and services and is widely used by governments to measure changes in the price level of the products that the typical household may buy in a particular time period. The metaphorical basket of goods measured for the CPI may include items such as clothing, food, fuel, electricity, rents, DVDs, airline tickets, bus fares, laptop computers, mobile phone service and so on. It also includes services, and its composition may be updated annually or bi-annually as new types of product become fashionable among consumers. For instance, the CPI in the mid-90s would probably have included the price of musical CDs. Today's CPI may instead include the price of digital music downloads.

A price index is found by dividing the price of a basket of goods in one period by the price of the identical basket of goods in a base period and multiplying by 100. To determine the price index, first a base period index must be established. For instance, assume the

A price index is an average of prices for a selection of goods and services in a particular nation during a given interval of time. A price index can be used to measure the changes in the price level of goods between one period of time and another.





government wishes to determine how much prices have risen between July and August. The index for the base period of July (CPI_J) is determined by the formula:

$$CPI_J = \frac{P_{bj}}{P_{bj}} \times 100$$

where P_{bj} is the price of a particular basket of goods in July.

Since P_{bj} divided by P_{bj} is 1, the index for the base period (July) is $1 \times 100 = 100$. Now the price of the same basket of goods can be measured in August, and using this information we can determine the consumer price index for August (CPI_A).

$$CPI_A = \frac{P_{bA}}{P_{bj}} \times 100$$

As a simple demonstration, let's revisit Country I and imagine that this country measures only three goods in its CPI: pizza, haircuts and wine (Table 14.1).

TABLE 14.1 CALCULATING A PRICE INDEX			
Good or service	Price in July/euro	Price in August/euro	Price in September/euro
pizza	10	10.50	10.50
haircuts	20	19	18
wine	8	10	10
total basket price	38	39.50	38.50

Assume July is the base period. To calculate Country I's CPI for August, we take the price of the basket of goods in August and divide it by the price of the same basket of goods in July and multiply the result by 100.

$$CPI_A = \frac{39.5}{38} \times 100 = 104$$

A real consumer price index, of course, includes hundreds of goods and services of various types, not just three. But the interpretation of the results is the same regardless of how many products make up the basket of goods. In our example, an increase in the price index from 100 to 104 indicates that a basket of goods that would have cost €100 in July would cost €104 in August. The purchasing power of the euro in Country I decreased and the country's economy experienced inflation between July and August.

Next, we can determine the price index for September (CPI_S) with the base period remaining July:

$$CPI_S = \frac{38.5}{38} \times 100 = 101.3$$

The price index in September indicates that the average price level decreased from August, but was still higher than in July. The economy experienced deflation between August and September. But, using July as the base period, Country I experienced inflation. A basket of goods that would have cost €104 in August costs only €101.3 in September. The purchasing power of the euro in Country I increased between August and September, but the euro still buys less in September than it did in July, since the basket of goods costing €100 in July cost €101.3 in September.



Is there such a thing as a typical household in a nation? What issues arise with fairness and equality when choosing the contents of a nation's CPI?

Weighting of categories in the CPI (HL only)

To account for the different proportions of a typical household's disposable income that goes towards the purchase of different types of goods, governments assign weights (% total income spent) to categories of goods measured in the CPI. The weight of any individual

category reflects its relative importance to the purchasing households and the total weight of all categories must add up to 100%.

The purpose of weighting categories in a CPI is to ensure that when a particular category of good experiences large fluctuations in price over time, the overall CPI does not fluctuate wildly. It simply adjusts in a manner that reflects the relative impact that price changes in that category have on the typical consumer's cost of living.

For instance, the US CPI divides the thousands of goods it measures into eight major categories, each assigned a weight reflecting its relative importance to the typical consumer (Table 14.2). The weight reflects the percentage of income spent on each good.

TABLE 14.2 WEIGHTED CATEGORIES IN THE US CONSUMER PRICE INDEX

Category (examples of goods and services included)	Weight – reflecting relative importance/%
food and beverages (breakfast cereal, milk, coffee, chicken, wine, full service meals, snacks)	14.795
housing (rent of primary residence, owners' equivalent rent, fuel oil, bedroom furniture)	41.96
apparel (men's shirts and sweaters, women's dresses, jewellery)	3.695
transport (new vehicles, airline fares, gasoline, motor vehicle insurance)	16.685
medical care (prescription drugs and medical supplies, physicians' services, eyeglasses and eye care, hospital services)	6.513
recreation (televisions, toys, pets and pet products, sports equipment, admissions)	6.437
education and communication (college tuition, postage, telephone services, computer software and accessories)	6.434
other goods and services (tobacco and smoking products, haircuts and other personal services, funeral expenses)	3.483
total	100

Worked example

To establish a weighted price index, we first determine the weighted price of a basket of goods by adding together the average price (P) of each category multiplied by the category weight expressed in hundredths.

Assuming a price index has three categories, A, B and C, the weighted price of the basket of goods is:

$$(P_A \times \text{weight in hundredths}) + (P_B \times \text{weight in hundredths}) + (P_C \times \text{weight in hundredths})$$

Examine Table 14.3.

TABLE 14.3 ESTABLISHING A SIMPLE WEIGHTED PRICE INDEX

Good	Average price in 2009 (\$)	Average price in 2010 (\$)	Percentage of income spent on each good (weight)/%
banana	2	1.50	25
haircut	11	10	30
taxi ride	8	10	45



To establish a price index with 2009 as the base year, we calculate the weighted price of the basket of goods for 2009. To do this, we multiply the average price of each good by its weight, expressed in hundredths:

- average price banana = $2 \times 0.25 = 0.5$
- average price haircut = $11 \times 0.3 = 3.3$
- average price taxi ride = $8 \times 0.45 = 3.6$

So, the weighted price of this basket of goods in 2009 = 7.4

Since we want 2009 to be our base year, we can establish the price index for 2009.

$$\text{Price index for 2009} = \frac{7.4}{7.4} \times 100 = 100$$

The price of both bananas and haircuts falls in 2010. You might think, therefore, that the average price level falls in total. However, the price of taxi rides increases and, because taxi rides are weighted more heavily than the other two goods, it is likely that this increase in price increases the average price level for a consumer in this country. To find out, we calculate the weighted price of the basket of goods for 2010:

- average price banana = $1.5 \times 0.25 = 0.375$
- average price haircut = $10 \times 0.3 = 3$
- average price taxi ride = $12 \times 0.45 = 5.4$

So, the weighted price of this basket of goods in 2010 = 8.775

To determine the price index for 2010, we divide the 2010 weighted price by the 2009 weighted price then multiply by 100:

$$\text{price index for 2010} = \frac{8.775}{7.4} \times 100 = 118.58$$

Based on the category weights, we can estimate the effect a change in the price of one good will have on the overall CPI and therefore the official inflation figure.

For instance, assume the price of bananas rises 15% between 2010 and 2011, but the price of haircuts and taxi rides remains unchanged. This 15% increase should be reflected in the inflation figure for that year, but the relatively small importance of banana expenditures for the typical household means that the total CPI and therefore inflation will rise by something less than 15%.

Worked example

If bananas account for 25% of the total CPI, determine how much a 15% increase in price in this category will affect inflation.

Multiply change in category price (P_C) by the category weight expressed in hundredths.

$$\% \Delta \text{CPI} = \% \Delta P_C (\text{weight} \times 0.01)$$

In the case of a 15% increase in banana prices, the effect on the CPI is:

$$\% \Delta \text{CPI} = 15 \times 0.25 = 3.75\%$$

If the price of bananas increases by 15% and the prices of all other categories remain constant, the effect on the overall CPI will be an increase of 3.75%.

If there is an increase in the price of goods in a category of greater relative importance to households (e.g. taxi rides), the impact on the overall CPI will be greater.

If the average price of taxi rides rises by 15% and all other categories remain unchanged, determine the impact on the CPI.

$$\% \Delta \text{CPI} = 15 \times 0.45 = 6.75\%$$

A 15% increase in the price of taxi ride will cause the overall CPI to increase by 6.75%, whereas an equal increase in the price of a relatively less important category of goods leads to a smaller increase in the overall CPI.

Through the weighting of categories based on relative importance to the typical households, a government attempts to make the consumer price index as accurate as possible a reflection of the actual effect of changing prices of different goods and services on the typical household.

Calculating the inflation rate using a CPI (HL only)

The inflation rate is the percentage change in a price index between one period of time and another. It measures the change in the average price of goods and services in a nation over time. The inflation rate can be either positive, negative, or zero.



A price index such as the CPI can be used to determine the *rate of inflation* between two periods of time. The inflation rate (IR) is determined using the following formula:

$$\text{IR} = \frac{\text{CPI}_2 - \text{CPI}_1}{\text{CPI}_1} \times 100$$

CPI₂ refers to the consumer price index for the second time period, CPI₁ for the time period *from which* the inflation rate is being determined. Dividing the change in the CPI by the original CPI will give a decimal, which when multiplied by 100 will give a percentage.

Referring back to Table 14.1, to calculate Country I's inflation rate between July and August, the percentage change in the price index must be found.

$$\text{IR} = \frac{\text{CPI}_A - \text{CPI}_J}{\text{CPI}_J} \times 100 = \frac{104 - 100}{100} \times 100 = 4\%$$

Between July and August, Country I experienced 4% inflation. The average price of the three consumer goods in the CPI increased by 4%; alternatively, the purchasing power of Country I's currency decreased by 4%. To determine the inflation rate between August and September, make the following calculation:

$$\text{IR} = \frac{\text{CPI}_S - \text{CPI}_A}{\text{CPI}_A} \times 100 = \frac{101.3 - 104}{104} \times 100 = -2.6\%$$

Between August and September, Country I experienced inflation of -2.6%. The average price level decreased. The economic term for negative inflation is deflation. Another way to interpret deflation is that the purchasing power of Country I's currency increased between August and September, since what would have cost €104 in August cost €101.3 in September.

HL EXERCISES

2 Use the table below to answer the questions that follow.

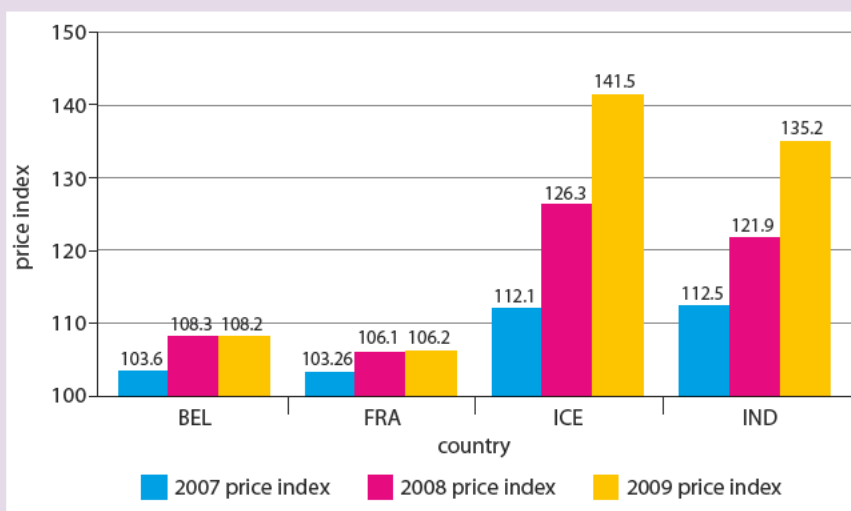
CPI date for Country I; Q3 = third quarter (i.e. July–September); Q4 = fourth quarter (i.e. October–December) etc.

	Q3 2008	Q4 2008	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2010
Country I's CPI	108.4	107.9	107.7	108.3	108.5	108.6	109.1

- Calculate Country I's inflation rates between each of the seven quarters.
- Between which quarters was the inflation rate highest? Lowest?
- Between which quarters did Country I experience disinflation?
- Between which quarters did Country I experience deflation?

- 3 Use the bar chart below to answer the questions that follow.

Price indexes for selected countries, 2007–09



- In which country was the inflation rate greatest between 2007 and 2008? Calculate the inflation rate.
- Which country or countries experienced deflation between 2007 and 2009? Calculate the deflation rate.
- Was inflation greater in Iceland between 2007 and 2008 or between 2008 and 2009? How do you know?

4

The table below shows the average prices of the goods purchased by a typical consumer in country Y in 2010 and 2011, as well as the percentage of a typical household's income spent on each item.

Good	Average price (2010)/\$	Average price (2011)/\$	Percentage of income spent on each item/%
hamburger	5.00	5.50	15
DVD	12.50	10	10
rent	90	105	40
book	8	6.50	15
petrol	15	18	20
weighted total	_____	_____	

- Use the table to construct a weighted price index for country Y for 2010 and 2011, using 2010 as the base year (= 100).
- Use your results to calculate the rate of inflation in country Y from 2010 to 2011.
- Assume the price of books increases by 10% from 2011 to 2012, but the price of all other goods remains constant. What would be the effect on the inflation rate?
- Now assume the price of rent increases by 10% instead, and all other prices remain constant. What would be the effect on the rate of inflation?
- Why does an increase in the price of some goods have a greater effect on inflation than identical percentage changes in the prices of other goods?

To access Worksheet 14.1 on inflation measures, please visit www.pearsonbacconline.com and follow the onscreen instructions.



Shortcomings of the CPI as a measure of inflation

The CPI is used in most nations to measure changes in the average price of goods and services purchased by the typical household in the nation between one time period and another. While the CPI provides an inflation rate that is meaningful to most households, the figure does have some shortcomings that must be acknowledged.

CPI does not reflect the purchases of all households in a nation

Not all of a nation's households are typical in that the income of a nation is not evenly distributed across all households. Some consumers will typically purchase a very different basket of goods than is measured to determine the CPI and inflation. If a large percentage of a consumer's income goes towards a small selection of the goods measured by the CPI, then the CPI as a whole may over or understate inflation depending on how the prices of those particular goods have changed relative to the rest of the goods measured.

CPI does not reflect changes in the quality of the products produced and consumed in a nation

The CPI only looks at one characteristic of the consumer goods it records: the price. What is not accounted for is the quality or the technology behind the products. For instance, the price of televisions may be measured in the CPI. Over the last several years, television technology has evolved rapidly from the bulky cathode-ray tube TVs of a decade ago to sleek, flat-screen HD TVs today. Soon, 3D televisions will become available and, at first, the prices of these models will be much higher than older models, which will make the CPI figure higher than it would be otherwise. What is not captured by this measure, however, is the improvement in consumer happiness resulting from improved quality and technology of newer and better televisions and other products that increase in both price and quantity.

Inflation calculated using the CPI may not measure changes in prices of important products like food and oil

In many countries, what is reported most often to households by the government is what's known as the core CPI. This price index does not include changes in the price of food and fuel, which economists ignore because of the frequent dramatic swings in price from one period to the next. However, for many households food and fuel make up a significant proportion of their total expenditures. A CPI that does not account for these goods may not accurately reflect the effect that inflation is having on the typical household.

CPI does not reflect price changes that affect producers

A nation's inflation rate is typically reported based on a *consumer* price index. For business firms, however, a more useful measure of inflation is the *producer* price index (PPI). A PPI measures a basket of goods made up primarily of intermediate products such as capital, raw materials, minerals and energy. An increase in the PPI from one period of time to the next affects costs of production for a nation's firms, and is more useful than the CPI in determining the extent to which AS will be affected by changes in the price of goods and services.

What information would be needed to develop a more accurate measure of the impact of rising prices in a nation on the various households within that nation? Could technology be better employed by governments or individuals to determine more accurate personal price indexes?



Learning outcomes

- Explain, using a diagram, that demand-pull inflation is caused by changes in the determinants of AD, resulting in an increase in AD.
- Explain, using a diagram, that cost-push inflation is caused by an increase in the costs of factors of production, resulting in a decrease in SRAS.
- Evaluate government policies to deal with the different types of inflation.

Inflation is an increase in the average price level of a nation's goods and services over time. The AS/AD diagram shows the average price level of a nation on its y-axis; therefore, any factor that changes the equilibrium price level in a nation causes inflation or deflation. The price level can change due to a shift in either a nation's AD or its AS.

Demand-pull inflation

An increase in any of the components of a nation's AD will lead to an increase in the nation's price level. Demand-pull inflation is defined as an increase in prices arising from the increased overall demand for a nation's output when consumption, investment, government spending or net exports rise without a corresponding increase in the level of AS (Figure 14.2). Demand-pull inflation is the macro equivalent of an increase in the price of a particular good arising from an increase in the demand for that good.

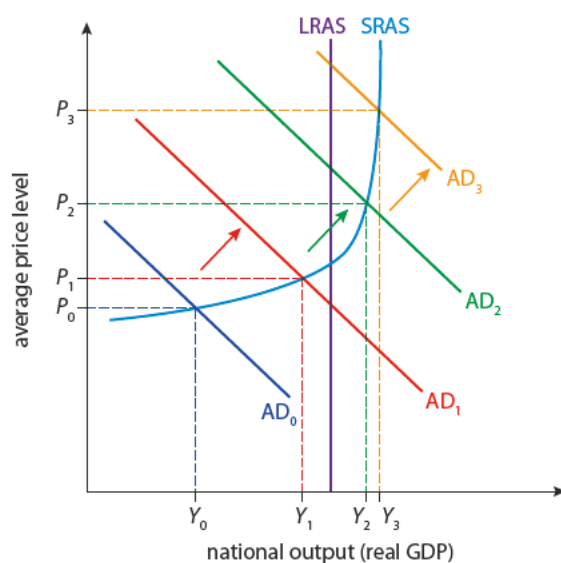


Figure 14.2

Demand-pull inflation in the AD/AS model.

The degree to which inflation will rise following an increase in AD depends on equilibrium level of output in the nation before AD began to rise. If a nation producing close to or at its full-employment level of national output (at AD_1 and Y_1 in Figure 14.2) experiences an increase in demand for its goods and services, either because of a rise in consumption, investment, government spending or export sales, then the competition among buyers for the economy's limited output will put upward pressure on prices and increase the price level from P_1 to P_2 and national output from Y_1 to Y_2 .

SRAS is relatively inelastic around the full-employment level of output, because the nation's resources (land, labour and capital) are already nearly fully employed. This explains why an increase in AD will lead to a large increase in the price level (P_1 to P_2) but a relatively small increase in the level of output (Y_1 to Y_2).

As can be seen, if AD were to continue to increase beyond AD_2 , little or no growth in output will result and inflation will rise even more as the price level increases to P_3 . High levels of demand-pull inflation correspond with an economy producing beyond its full-employment level of national output in which resources are nearly all employed in the output of goods and services. Such an economy is said to be over-heating and in the long run, the competition for scarce resources will drive up nominal wages, rents and other costs to firms, shifting the SRAS to the left and returning the economy to its full-employment level of output, at a much higher price level.

Next observe what happens if this nation were to begin at AD_0 , a level of demand at which this economy experiences a rather low price level (P_0) and a level of output far below its full-employment level (Y_0). The economy is in a recession, meaning that resources are underemployed and there are large quantities of land, labour and capital sitting idle. An increase in AD from AD_0 to AD_1 will, therefore, result in a relatively small increase in the price level (P_0 to P_1) and a larger proportional increase in national output (Y_0 to Y_1). Producers in this economy find it cheap and easy to hire workers and invest in capital since there is an excess capacity of labour and capital in the country. SRAS is highly elastic below full employment, indicating that an increase in AD can lead to relatively large increases in output without causing significant inflation.

The implication of this analysis is that policymakers need to be conscious of the existence of demand-pull inflation, but must also be able to evaluate its likelihood given the current equilibrium level of national output. Policies aimed at increasing AD can be very effective at stimulating economic growth (increasing real GDP) when an economy is producing far below its full-employment level (Y_0 in Figure 14.2) without the threat of inflation arising. However, if an economy is producing near or at its full-employment level of GDP (Y_1 and Y_2 in Figure 14.2), then policies aimed at stimulating AD will do little to achieve increases in output but will likely lead to higher and higher rates of inflation as the spending on goods and services rises but the nation's AS remains unchanged.

What evidence would be needed to determine whether the level of inflation in an economy is good or bad?



Demand-pull inflation is when too many consumers are chasing too few goods, so the average price of goods and services in a nation rises. Demand-pull inflation is illustrated by an outward shift of AD when a nation is at or near its full-employment level of output.



Cost-push inflation

A second type of inflation arises when the costs of production to a nation's firms increases. The primary determinants of SRAS are the productivity of the nation's resources and the costs of production of the nation's firms. Anything that decreases productivity or increases costs of production will shift a nation's SRAS to the left and drive up costs of production (Figure 14.3). An unexpected decrease in AS is known as a negative supply shock and may arise as a result of the following.

- **An increase in oil prices.** Oil is used in the production or transportation of nearly everything. An increase in the price of oil drives up costs of production across all sectors of a nation's economy and will shift AS to the left, increase inflation and reduce national output.
- **An increase in the nominal wage rate.** In some countries, labour unions have the power to force large increases in nominal wages. Also, minimum wage laws may raise labour costs to firms, forcing them to pass higher costs on to consumers as higher prices. If wages increase across industries, national output will decrease as inflation increases.

- **Depreciation of the nation's currency.** If a country's currency suddenly decreases in value relative to other currencies, imported raw materials become more costly to firms and their costs of production rise, reducing SRAS.
- **Natural disaster or war.** Events such as hurricanes, droughts, earthquakes and other natural disasters can destroy a nation's infrastructure and lead to higher costs of production for firms. Likewise, a devastating war may reduce the labour force and nation's capital stock, leading to higher costs and a fall in national output.
- **Higher taxes on firms.** Corporate taxes raise firms' costs of production and may force businesses to reduce employment and raise their prices.

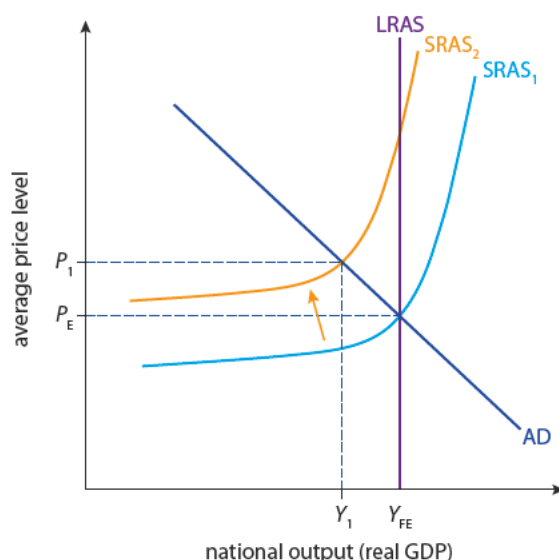


Figure 14.3

Cost-push inflation in the AD/AS model.

i Cost-push inflation is when the costs of production faced by a nation's producers rise (due to higher energy costs, wages for workers, business taxes, etc.) so the nation's SRAS curve shifts to the left and the average price level of the nation's output rises. Cost-push inflation is sometimes accompanied by stagflation – a term that means the economy is stagnating, experiencing either zero or negative economic growth.

Cost-push inflation poses a particular challenge to policymakers, since it leads to an increase in both inflation and unemployment. In the short-run, macroeconomic policies are rather ineffective at resolving both of these problems. The only way a nation experiencing cost-push inflation can bring price levels down without driving up unemployment rates is by increasing its SRAS through policies that lower costs to firms that have experienced unexpected cost increases due to one of the reasons above. Supply-side policies are discussed in more depth in Chapter 19.

14.3

Consequences of inflation

Learning outcomes

- Discuss the possible consequences of a high inflation rate, including greater uncertainty, redistributive effects, less saving, and the damage to export competitiveness.

Maintaining a stable price level

Maintaining a stable price level by keeping inflation low is a major goal of macroeconomic policies. Governments and central banks regularly use monetary, fiscal and supply-side policies (Chapters 17, 18 and 19) to target an inflation rate of 2–3%. An inflation rate of below 2% may send a signal to a nation's households and firms that disinflation may

continue and lead to deflation, which itself poses a major threat to an economy's health. Inflation of greater than 3%, on the other hand, can have its own detrimental effect on a nation's economy, including:

- loss of purchasing power
- lower real interest rates for savers
- higher nominal interest rates for borrowers
- reduction of international competitiveness.

Loss of purchasing power

As prices rise and household incomes remain constant or rise at a slower rate than inflation, people become poorer in real terms. Even if a household's income rises in nominal terms, if the inflation rate rises by more than the household's does, then real income is actually falling. A change in a household's real income is found by subtracting the inflation rate from the change in nominal income. As a nation's price level rises, households' real incomes decrease.

As an example of inflation's effect on income, let's examine a hypothetical Indian worker using the price index data shown earlier in the chapter.

Worked example

A worker earning a nominal income (Y_N) of 100 000 rupees in 2008 gets a pay rise and earns 110 000 rupees in 2009. The worker's nominal wage has increased by 10%. In order to determine the effect on the worker's real income (Y_R), we must first calculate his real income in 2008 and his real income in 2009. Real income is found by dividing nominal income by the year's price index expressed in hundredths.

$$Y_R = \frac{Y_N}{\text{CPI} \times 0.01}$$

Using the CPI data for India in 2008 and 2009, we can calculate the worker's real income for both years.

$$\text{CPI}_{2008} = 121.9$$

To find the worker's real income in 2008, we divide his nominal income by the CPI for 2008 expressed in hundredths.

$$\text{Real income in 2008} = 100\,000 / 1.219 = 82\,034 \text{ rupees}$$

$$\text{CPI}_{2009} = 135.2$$

The worker's real income in 2009 is his nominal income divided by the price index expressed in hundredths.

$$\text{Real income in 2009} = 110\,000 / 1.352 = 81\,361 \text{ rupees}$$

To find the inflation rate between 2008 and 2009, divide CPI_{2009} by CPI_{2008} and multiply by 100.

$$\text{Inflation between 2008 and 2009} = (135.2 - 121.9) / 121.9 \times 100 = 10.9\%$$

The worker's nominal income increased by 10%, but inflation was 10.9%. Therefore, the worker's real income, once inflation has been accounted for, fell.

$$\text{Change in real income} = (81\,361 - 82\,034) / 82\,034 \times 100 = -0.82\%$$



Despite his nominal pay increase of 10%, the worker in our example actually became poorer in real terms, since the average price of goods and services increased by 10.9%. His real income actually declined by 0.82% due to the higher prices in 2009.

Lower real interest rates for savers

Savers in fixed-interest assets (such as most government bonds and savings accounts) are negatively affected by inflation since the real interest rate earned on savings falls as the inflation rate rises.

For example, if a household places \$1000 in the bank today at a fixed annual interest rate of 5%, and there is inflation of 7% over the next year, then the real value of the savings decreases by 2%. While the saver will have \$1050 (5% more) in dollar terms, \$1070 (7% more) would be needed to consume the same amount of output as the \$1000 a year earlier. The real interest (IR_R) on savings is the nominal interest rate (IR_N) minus the rate of inflation. Therefore, investments with a fixed interest rate are harmed by inflation.

$$IR_R = IR_N - \text{inflation}$$

Higher nominal interest rates for borrowers

In times of high inflation, banks raise the nominal interest rates they charge borrowers. A lender who intends to earn a real return of 4% on loans will charge a higher interest rate if inflation is expected in the near future. The nominal rates borrowers pay rise with the expected inflation rate, making it more costly for firms and households to borrow. The nominal interest rate (IR_N) borrowers pay equals the real interest rate (IR_R) plus an inflation premium (IP) added to offset the decrease in the value of money repaid by the borrower caused by inflation.

$$IR_N = IR_R + IP$$

Reduction of international competitiveness

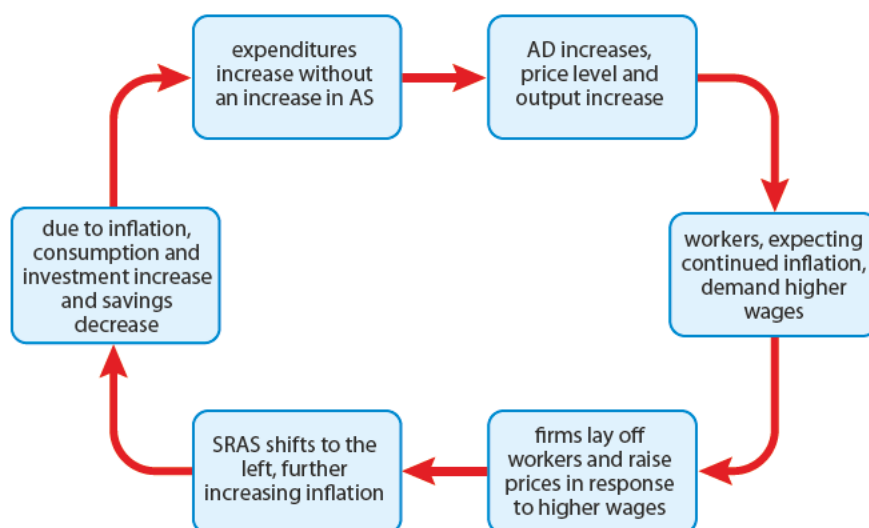
High inflation at home makes domestic output less attractive to foreigners, and imports more attractive to domestic consumers. The resulting fall in demand for exports and increase in demand for relatively cheaper imports will move a country's trade balance towards a deficit, reducing AD and leading to a loss of jobs in export industries.

The inflationary spiral

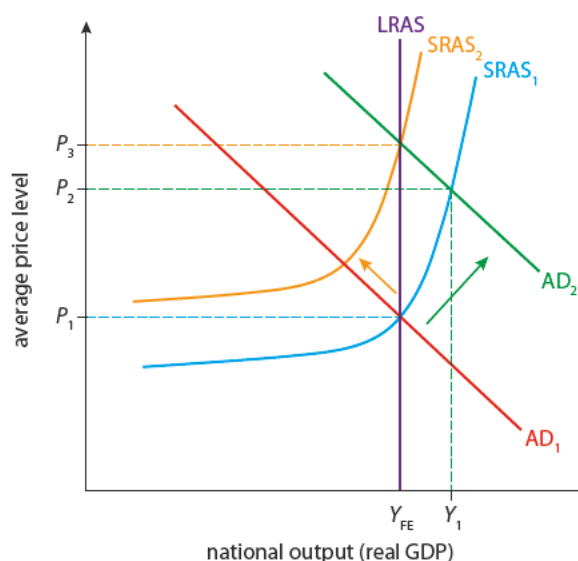
In a situation in which demand-pull inflation exists, an economy can produce beyond its full-employment level of output in the short run. It could be argued that such inflation is desirable because it leads to increases in output and lower unemployment. Such gains are only experienced in the short run, however, since in the long run, the expectation of further inflation forces workers to demand higher nominal wages to offset the decline in real wages caused by higher prices. Wage hikes and the rise in other input costs due to the increasing scarcity of productive resources force firms to reduce employment and raise their prices. In other words, demand-pull inflation, if it persists, leads to cost-push inflation. This is known as an inflationary spiral and it poses a major threat to an economy (Figures 14.4 and 14.5, overleaf).

Figure 14.4

The inflationary spiral.

**Figure 14.5**

An inflationary spiral in the AD/AS diagram.



Inflation's costs to the many (fixed-income earners, savers and lenders and exporters) generally outweigh its benefits to the few (borrowers with a fixed-interest rate) (Table 14.4). Macroeconomic fiscal and monetary policies, therefore, aim to maintain a low and stable rate of inflation in the nation so that households and firms can anticipate price level

TABLE 14.4 WHO IS HELPED AND HURT BY INFLATION?

Helped/not affected by inflation	Explanation	Hurt by inflation	Explanation
Borrowers	Inflation lowers the real interest rate paid by borrowers, so money paid back from a loan is worth less than the money borrowed.	Lenders	Inflation lowers the real interest rate earned on loans, so the money paid back by borrowers is worth less than the money lent.
Flexible-income earners	Wages are indexed to inflation, so any increase in the price level is matched by an income increase.	Fixed-income earners	Inflation reduces real income, making fixed-income earners poorer in real terms as inflation rises.
Importers	Imports appear relatively cheaper when the price of domestic output rises.	Savers	Inflation lowers the real interest rate earned on savings, so money saved is eroded by inflation.
		Exporters	Domestic inflation makes products to be exported less attractive to foreign buyers.

changes and make confident economic decisions based on the expectation of future price level stability. Low inflation gives firms confidence that their products will continue to rise in price in the future and makes investment in new plant and technology a profitable prospect. Deflation, on the other hand, poses a much more serious threat than mild inflation to a nation's economy.

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14.4 Deflation and its consequences

Learning outcomes

- Discuss the possible consequences of deflation, including high levels of cyclical unemployment and bankruptcies.

Despite the negative effects of inflation outlined above, mild inflation is desirable and evidence of a healthy, growing economy. Deflation, a decrease in the average price level (or an increase in the value of money) is a major threat to a nation's economy and can plunge an economy into a steadily worsening recession in which firms faced with continuously falling prices lay off increasing numbers of workers, lowering disposable incomes and further worsening the deflationary pressure in the economy.

There are two basic causes of deflation; one is extremely undesirable while the other is actually desirable. Deflation due to a fall in AD (demand-deficient deflation) is a dangerous threat to an economy (Figure 14.6a). However, generally speaking, lower prices of goods and services can be a good thing for a nation, as long as they are not accompanied by increasing unemployment and falls in consumption and investment. If deflation is caused by increase in productivity of the nation's resources or lower costs of production to firms, it is considered desirable (supply-side deflation) (Figure 14.6b). An outward shift of a nation's AS curve increases employment, output, and the real incomes of households who find their nominal incomes able to purchase more output as prices fall in the economy.

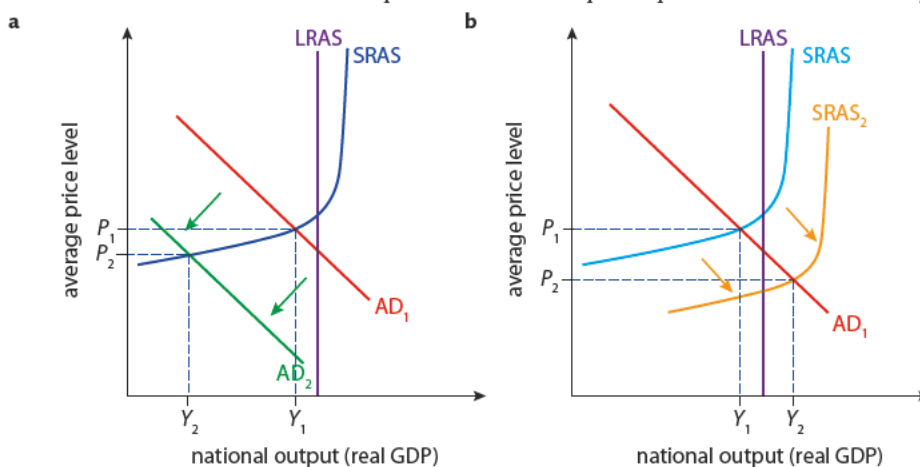


Figure 14.6
Deflation in the AD/AS model. **a** Demand-deficient deflation; **b** supply-side deflation.

Supply-side deflation

Causes of supply-side deflation:

- lower oil prices
- more productive labour force
- appreciation of the nation's currency
- lower minimum wage
- better infrastructure
- lower corporate taxes.

An increase in AS can lead to a lower level of unemployment, greater output, and higher real incomes as the price level decreases while nominal incomes stay the same. Such outcomes are certainly desirable, and certain macroeconomic policies may be used to help promote increases in AS. These supply-side policies are discussed in depth in Chapter 19.

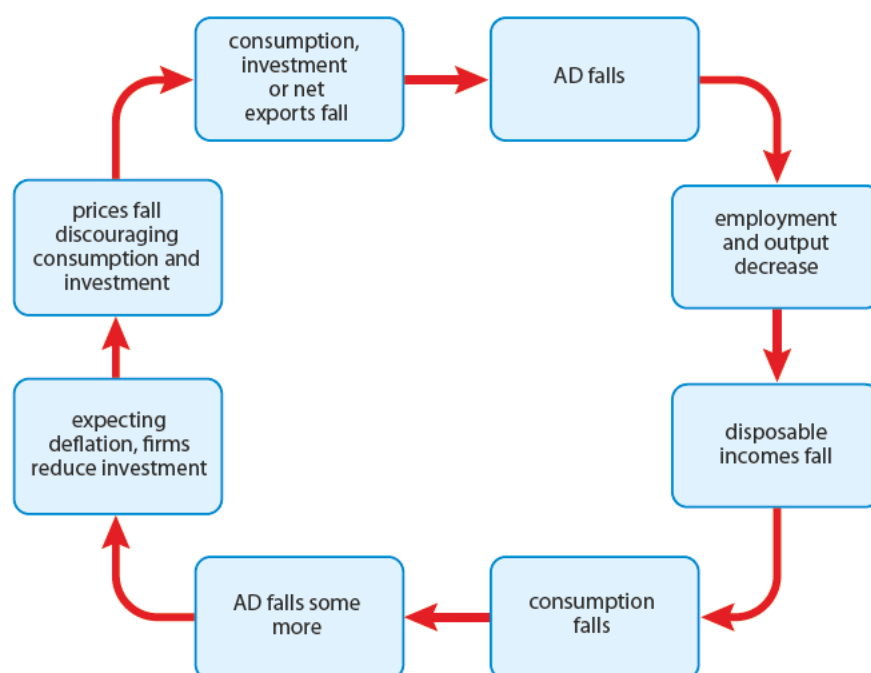
Deflation due to fall in AD

The more dangerous form of deflation is that caused by a fall in AD in a nation. A demand-deficient recession leads to rising unemployment and puts downward pressure on the price level. Following a decrease in expenditures, prices tend to be inflexible in the short run as AD moves along the horizontal portion of the AS curve. The longer a recession lasts, the greater the downward pressure on prices becomes. Firms are forced to lay off workers in response to falling demand, which reduces households' disposable incomes leading to further falls in consumption.

The expectation of future falling prices creates an incentive for firms to postpone new investments in capital since they can reasonably expect lower returns on such investments as prices are falling. Less capital means less demand for workers, further adding to unemployment. Households faced with the prospect of falling prices and wages also have an incentive to reduce consumption and increase savings in anticipation of lower incomes and prices in the future. Deflation increases the value of savings since the real interest rate rises when prices are falling (remember, the real interest rate equals the nominal interest rate minus the inflation rate; therefore if inflation is negative then the real interest rate is greater than the nominal interest rate, increasing the incentive to save).

Furthermore, deflation increases the real amount of debt owed by borrowers, so households with credit card or other consumer debts will face a greater real debt burden which, combined with falling incomes, reduces their ability to consume even more. Therefore, AD continues to fall and deflationary pressures build as an economy plunges further into recession (Figure 14.7). The deflationary spiral is perpetuated as firms and households face the uncertainty of future economic conditions and adjust their behaviours based on the reality and future prospects of deflation.

Figure 14.7
The deflationary spiral.



The costs of deflation can be summarized as follows:

- rising unemployment
- falling consumption and increased savings
- falling investment
- increased debt burden on households.

If left unchecked, deflation in an economy may lead in a downward spiral towards recession and unemployment. It is, therefore, important that policymakers in government and central banks take measures to maintain a stable price level with a low and predictable rate of inflation. Avoiding demand-deficient deflation is of the utmost importance; on the other hand, policies that promote an increase in SRAS and thereby lead to supply-side deflation may prove effective at promoting economic growth and full employment. The distinction between demand-side and supply-side policies is explored in depth in Chapters 17–19.

CASE STUDY

Deflation may post a greater threat than inflation

The US economy is at its lowest point since 1982. And this situation is likely to worsen in the coming months. Downward pressure on wages and prices is strengthening due to declining house prices and an unemployment rate of 9% leading to intense worker competition for scarce jobs. The deflationary environment is exacerbated by energy prices dropping 4.4% in a month and firms undercutting each other for sales.

With the Fed's (central bank's) latest monetary stimulus, fear of inflation is widespread, but the evidence points to deflation being the greater threat. Pay freezes and wage cuts indicate that prices may fall before they rise. Nearly a third of US households report a cut in pay or a cut in working hours in the last year.

It is economic progress if prices fall because worker productivity improves (as when industrial progress mechanized production). But current deflation is due to falling demand not rising productivity. Falling household incomes and high debt levels reduce the ability of Americans to consume, and this contributes to falling demand for labour. Lower incomes and declining sales increase the burden of debt on households and firms; this causes borrowers to further reduce spending to service their debts and deepens the recession.

In the first four years of the Great Depression (1929–33), prices in the US fell by 27%. Today, central banks are taking action: in the US, Britain, Japan and Switzerland interest rates have been pushed close to zero.

Inflation is a threat to any economy, but deflation must not be under-estimated. Inflation may be easier to correct than deflation: interest rates can be raised as high as a central bank wishes, but they can be lowered only to zero. Falling incomes and rising unemployment will continue to depress growth, deepen deflation and reduce incentives for firms to invest and hire workers. The Fed and other central banks should now undertake policies that err on the side of inflation, a little of which would be less catastrophic than the deflation looming today.



The concepts of inflationary and deflationary spirals highlight the fact that individuals in society do not always act in a purely rational way. Why don't workers simply accept lower wages and allow firms to maintain full employment in periods of deflation? Is human nature so selfish that we would rather see those around us become unemployed and risk becoming unemployed ourselves than accept a lower wage?

EXERCISES

- 5 When is deflation desirable? What is the difference between the deflation of the late 19th century and the deflation of today? What are some the threats posed by deflation?
- 6 Using an AD/AS diagram and evidence from the case study above, illustrate what you believe represents the US current equilibrium level of output and prices.
- 7 Explain why the expectation of future deflation can have as equally devastating an effect as actual deflation.
- 8 Why does deflation pose a particular threat to households with high levels of debt?
- 9 In what ways does deflation present a bigger challenge to macroeconomic policymakers than inflation?



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14.5

Relationships between unemployment and inflation: the Phillips curve (HL only)

Learning outcomes

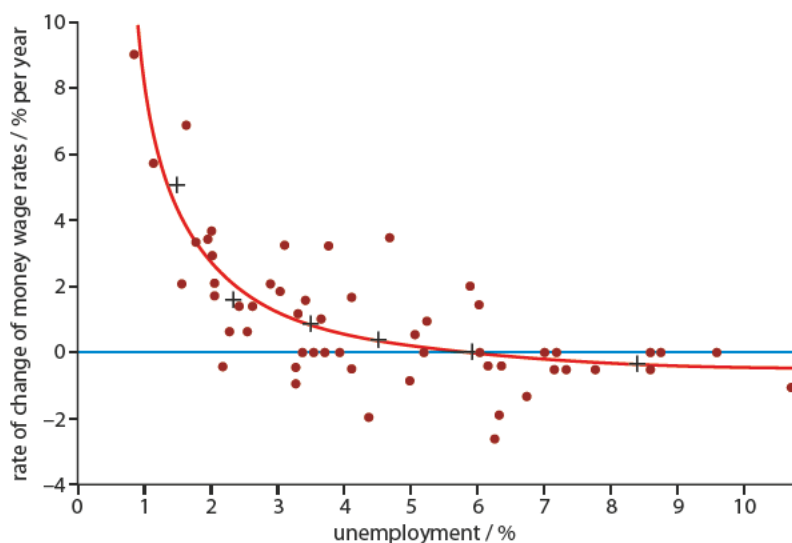
- Discuss, using a short-run Phillips curve diagram, the view that there is a possible trade-off between the unemployment rate and the inflation rate in the short run.
- Explain, using a diagram, that the short-run Phillips curve may shift outwards, resulting in stagflation (caused by a decrease in SRAS due to factors including supply shocks).
- Discuss, using a diagram, the view that there is a long-run Phillips curve that is vertical at the natural rate of unemployment and, therefore, there is no trade-off between the unemployment rate and the inflation rate in the long run.
- Explain that the natural rate of unemployment is the rate of unemployment that exists when the economy is producing at the full-employment level of output.

You will have noticed in our analysis of inflation and deflation that in some cases, there is a short-run trade-off between unemployment and inflation. If AD increases in a nation producing at or near its full-employment level of output, firms will hire more workers to meet the increase in demand and the nation's unemployment rate falls. Additionally, since there is more demand for the same level of AS, increases in AD beyond the full-employment level lead to an increase in the average price level. A change in AD, therefore, leads to a short-run trade-off between inflation and unemployment.

This relationship was first observed by New Zealand economist William Phillips in a 1958 paper 'The relationship between unemployment and the rate of change of money wages in the United Kingdom 1861–1957', published in *Economica*. In his paper, Phillips observed historical data comparing unemployment rates and the rate of change in money wages, in other words, how much the average wage rate increased or decreased compared to the change in the unemployment rate (Figure 14.8).

Phillips observed that in years in which UK unemployment was relatively low (for instance,

Figure 14.8
The original Phillips curve.





below 3%), there tended to be upward pressure on the average wage rate (with wage increases in excess of 2%). As can be seen, in the years when unemployment was at its lowest (below 2%), money wage rates grew most rapidly (by 6% or more).

On the other hand, when unemployment was high (greater than 6%) money wages tended not to increase or they would even decrease. The explanation for this trade-off is rooted in simple supply and demand analysis. High unemployment means a greater supply of labour, which puts downward pressure on the price of labour, the nominal wage. Conversely, when unemployment is low, the supply of labour available to firms falls and the price of labour increases.

The short-run Phillips curve

Modern economists have modified Phillips's analysis slightly, and replaced the rate of change in money wages with the rate of change in the average price level, or inflation. The modern Phillips curve, therefore, compares the unemployment rate with the inflation rate. In addition, the Phillips curve which reflects an inverse relationship between inflation and unemployment is now known as the short-run Phillips curve because, in the long-run, there is no clear trade-off between the two variables (Figure 14.9).



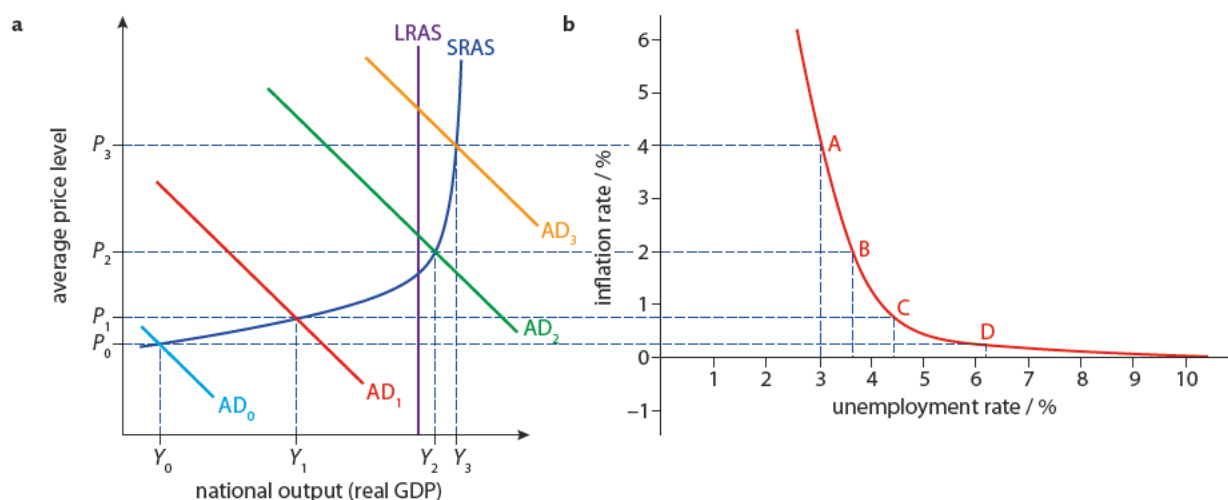
Figure 14.9

The short-run Phillips curve.

A short-run Phillips curve (SRPC) looks almost identical to the original Phillips curve. The only difference is that the y-axis shows the inflation rate as opposed to the percentage change in money wages. The modification is easily justified when we consider that one of the primary determinants of a nation's price level is the nominal wage rate in the economy. In most developed countries, the cost of labour makes up the largest component of firms' costs of production. Therefore, when the money wage rate increases in an economy, this tends to correspond with an increase in the price level. Likewise, at lower wage rates, there is downward pressure on prices.

Shifts in AD and movements along the SRPC

According to the SRPC model, high levels of unemployment correspond with low levels of inflation (point C in Figure 14.9), while low unemployment is accompanied by high inflation (point A in Figure 14.9). To understand the reason for this trade-off, it is useful to think of the SRPC in relation to a nation's short-run SRAS.

**Figure 14.10**

Mirror images: **a** SRAS;
b SRPC.

The y-axis of the AD/AS diagram shows the nation's average price level (PL) and the same axis in the SRPC diagram shows the change in the average price level (inflation). Anything that leads to a change in PL is naturally leading to change in inflation.

Similarly, the x-axis in the AD/AS model shows national output, which is directly related to the level of employment in the nation (since higher output leads to more employment). The x-axis in the SRPC model shows unemployment; therefore anything that increases employment and output in the AD/AS diagram will lead to a decrease in unemployment in the SRPC model.

The two curves are mirror images, as you can see in Figure 14.10 (above). Therefore, anything that causes a movement along a nation's SRAS will cause a movement along its SRPC.

In Figure 14.10, observe what happens when the nation's AD increases from AD_0 to AD_1 . The increase in demand for the nation's output leads to an increase in employment of workers, which reduces unemployment in the economy from 6.2% to 4.4% as seen in the SRPC diagram. As resources become more scarce due to increased demand from producers, there is a slight increase in the price level from P_0 to P_1 , which is reflected by an increase in inflation from around 0.2% to around 0.8% as seen in the SRPC diagram. The increase in AD causes a movement up and to the right along the nation's SRAS, and a movement up and to the left along the SRPC (from point D to point C). Increased demand for the nation's output causes a fall in unemployment and an increase in inflation.

As AD continues to increase from AD_1 to AD_2 and then from AD_2 to AD_3 , output and employment continue to increase, albeit at a decreasing rate as the economy moves beyond its full-employment level of national output. Unemployment continues to fall, but at a slower rate, in the SRPC diagram, while inflation begins to accelerate. You will recall that when an economy approaches its full-employment level of output, the threat of demand-pull inflation becomes imminent. This is reflected in the inelastic range of the SRAS and the steep section of the SRPC when unemployment falls below the natural rate of unemployment (NRU) and inflation begins to accelerate. At AD_3 , the economy experiences an inflation rate of 4% while unemployment falls to around 3%, indicating that firms faced with rising demand have had to raise the price of their output to avoid shortages.

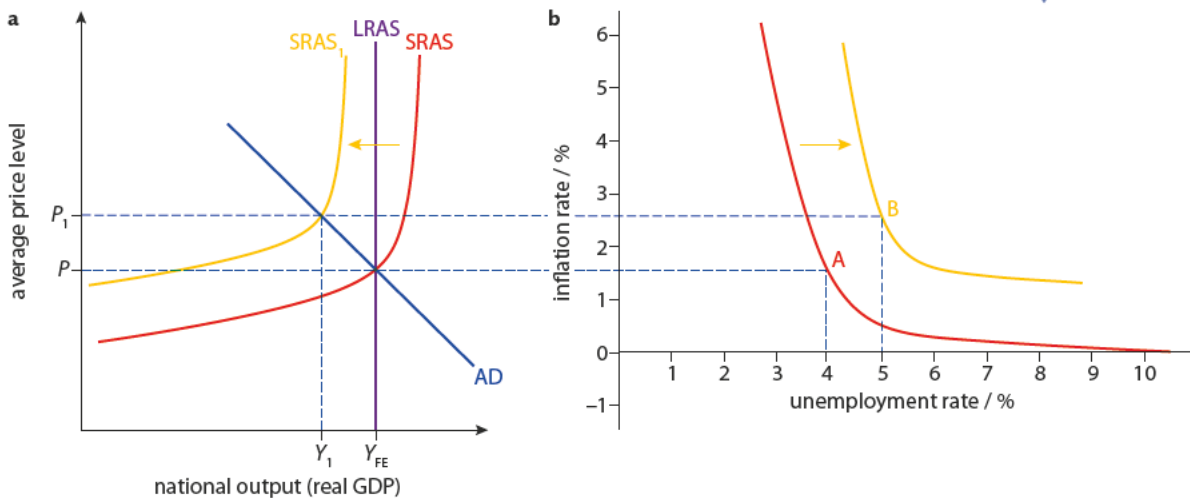
A movement of AD along the SRAS curve will cause a change in employment and the price level, which corresponds with changes in unemployment and inflation in the SRPC model. The short-run trade-off between unemployment and inflation is therefore observed when the level of AD changes but SRAS remains the same.

Supply shocks and shifts of the SRPC

Just as a movement along the SRAS corresponds with a movement along the SRPC, a shift of a nation's SRAS causes a shift of its SRPC. An increase in the nominal wage rate or any other cost of production across a nation's primary, secondary and tertiary sectors will shift SRAS to the left, causing an increase in both inflation and unemployment.

The term coined by economists to describe the effects of such a negative supply shock is stagflation; a combination of the words stagnant and inflation. In the case of an increase in costs of production to firms, growth in output will become stagnant or even negative and both inflation and unemployment will increase. Stagflation results from any of the factors that cause cost-push inflation in a nation. The effects of a supply shock on the SRPC are illustrated in Figure 14.11.

Figure 14.11
Supply shock shifts the SRPC outwards.



The economy in Figure 14.11 has experienced an increase in both unemployment and inflation (stagflation) due to a negative supply shock. The shift to the left of the SRAS (Figure 14.11a) and the resulting shift to the right of the SRPC (Figure 14.11b) could have resulted from an increase in the nominal wage rate, and increase in energy prices, an increase in business taxes or a non-economic event such as a natural disaster that destroyed the nation's infrastructure and made doing business more costly for firms.

An increase in SRAS would have the opposite effect on the SRPC, shifting it to the left, reducing unemployment and inflation. Any factor that leads to lower costs to firms or greater productivity of resources could lead to a lower rate of inflation and lower unemployment, as firms are able to hire more workers and sell their output for lower prices.

i Stagflation is an increase in inflation combined with stagnant or negative growth and rising unemployment, caused by a negative supply shock. Stagflation is the result of a decrease in short-run aggregate supply.

The long-run Phillips curve

To understand why the downward-sloping Phillips curve first posited by William Phillips and later adapted by modern economists only represents the short-run relationship between unemployment and inflation, it is useful to continue our analysis of the scenarios depicted in Figure 14.11.

Assume an economy is producing at its full-employment level of output and AD increases. Inflation is now higher than desired by policymakers, and unemployment is at a rate that is below the nation's NRU. Labour markets are tight (firms find it harder and harder to hire new employees since pretty much everyone who wants a job is already employed).

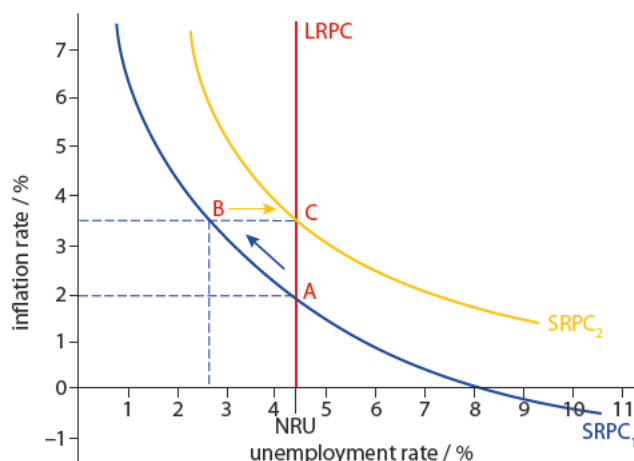
In the long run (the flexible-wage period) workers begin to calculate the higher price levels into their salary negotiations, and therefore the tight labour markets will force firms who wish to hire more workers to offer higher nominal wages than their competitors in order to attract talent away from other firms. The effect of demand-pull inflation, in the long run, is an increase in the nominal wage rate, which will ultimately force firms to reduce employment and raise prices even further.

And herein lies a problem with the Phillips curve model. According to the SRPC, anything that leads to an increase in unemployment should cause a fall in inflation. However, as we have just seen, anything that increases costs to firms will lead to both an increase in inflation and unemployment, apparently contradicting the Phillips curve model. In the long run, once wages have adjusted upwards in response to demand-pull inflation, the unemployment rate will return to its natural level and inflation will return to a stable rate higher than before the initial increase in AD.

In other words, in the long run, there is no trade-off between unemployment and inflation; unemployment will return to the natural rate regardless of the rate of inflation. Figure 14.12 illustrates the transition from the SRPC to the LRPC.

Figure 14.12

The long-run Phillips curve following an increase in AD.



In Figure 14.12, the economy began at point A when the equilibrium level of output is at the full-employment level. The unemployment rate that prevails at full-employment output is considered the nation's NRU (here, at around 4.5%). An increase in AD beyond the full-employment level leads to a fall in unemployment and a rise in inflation and a move up and to the left along $SRPC_1$ to point B.

In the long run, higher inflation forces workers (who anticipate a decline in their real wages due to the inflation ahead) to demand higher wages; a demand to which firms respond by laying off some of their now more costly workers. The increase in AD and higher nominal wages lead to a higher level of inflation, but ultimately the same level of unemployment as before AD increased. Once wages have adjusted upwards in response to demand-pull inflation, unemployment returns to its natural rate and inflation in the economy rises (from 2% to 3.5%).

In the long run, it is observed, there is no trade-off between unemployment and inflation. Just as the nation's output will always return to its full-employment level in the AD/AS model due to the flexibility of wages in the long run, unemployment will always return to the NRU in the LRPC model. Any time unemployment falls below the natural rate, inflation forces workers to demand higher wages, which leads firms to cut back on hiring until unemployment has once again increased to the natural rate.

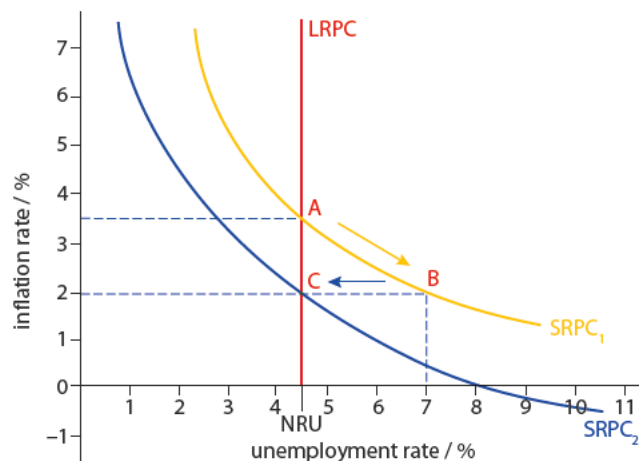


Figure 14.13

The long-run Phillips curve following a decline in AD.

On the other hand, if unemployment increases above the natural rate, the surplus of labour in the economy causes wages to fall in the long run, leading firms to hire more workers and lower their prices until unemployment returns to the natural rate at a new, lower level of inflation. The LRPC demonstrates that there is no trade-off between unemployment and inflation following a decrease in AD (Figure 14.13, above).

A demand-deficient recession puts downward pressure on prices as AD moves left and downwards along the SRAS, which leads to an unemployment rate greater than the NRU and a move right and downwards along $SRPC_1$. In the long run, in an economy with high unemployment and low inflation, unemployed workers begin accepting lower nominal wages, which encourages firms to once again hire workers, increasing output and reducing unemployment until it returns to its natural rate. In the long run, the economy self-corrects, returning output to its full-employment level due to the flexibility of wages and prices.

The theory of the LRPC aligns nicely with the neo-classical theory of AS, which is believed to be vertical at the full-employment level of national output. According to the neo-classical school of economic thought, the real output of a nation is independent of the price level, and returns to the full-employment level once wages and prices have adjusted to fluctuations in AD; therefore AS is perfectly inelastic at the full-employment level of output. Since the rate of unemployment which prevails at Y_{FE} is the natural rate or NRU, the unemployment rate in the economy returns to the NRU in the long run regardless of the level of AD and inflation. Therefore, the LRPC is vertical at the NRU.

Another name for the NRU is the non-accelerating inflation rate of unemployment (NAIRU). Since an economy producing at its full-employment level should experience a stable rate of inflation, maintaining the NAIRU ensures that inflation neither rises nor falls. If unemployment falls below the NAIRU, inflation is expected to accelerate in the short run and, as the economy returns to its NAIRU, once again to stabilize, possibly at a higher rate. If unemployment increases above the NAIRU, disinflation or even deflation result until, in the long run, wages and prices adjust so unemployment returns to the NAIRU and the inflation rate stabilizes once again at a lower rate. An economy achieving its NAIRU feels neither upward nor downward pressure on the inflation rate as long as AD does not fluctuate too much beyond or below the full-employment level.

The reflective nature of LRPC and LRAS indicates that it may be possible to reduce a nation's NRU in the long run. Anything that reduces the level of structural and frictional unemployment may result in a lower NRU. Supply-side policies such as fewer unemployment benefits for those looking for jobs, better education and training, and lower income taxes may promote an increase in the LRAS and a corresponding shift left of the LRPC (Figure 14.14, overleaf).

i Non-accelerating inflation rate of unemployment (NAIRU) is the level of unemployment that prevails when a nation is producing at its full-employment level of output. The phrase 'non-accelerating inflation' refers to the fact that at this unemployment rate, there is very little upward pressure on the price level in the economy, since firms are able to employ more workers without the wage rate being driven up, causing cost-push inflation.

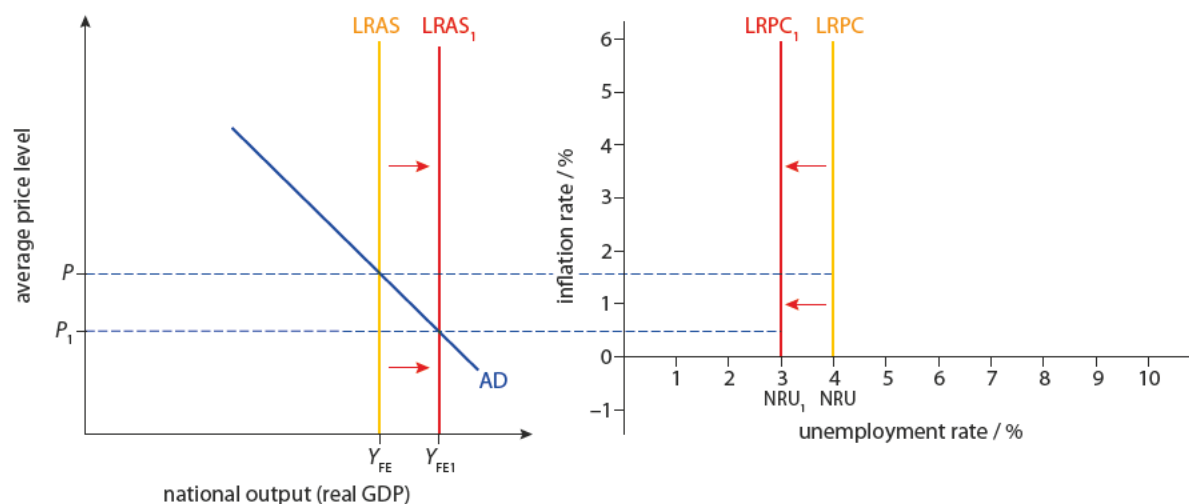


Figure 14.14
LRAS and LRPC.

Real-world evidence of the Phillips curve relationship

It should be noted that the original Phillips curve theory did not distinguish between the short run and the long run. In fact, the original Phillips curve itself was a long-run model demonstrating a trade-off between unemployment and changes in the wage rate over a span of 52 years in the UK. Up until the early 1970s, the Phillips curve was treated as a generally accurate demonstration of the relationship between two important macroeconomic indicators. Throughout the 1960s, data for the US showed in most cases that increases in unemployment corresponded with lower inflation rates, and *vice versa* (Figure 14.15 and Table 14.5).

Figure 14.15
America's Phillips curve,
1960–69.

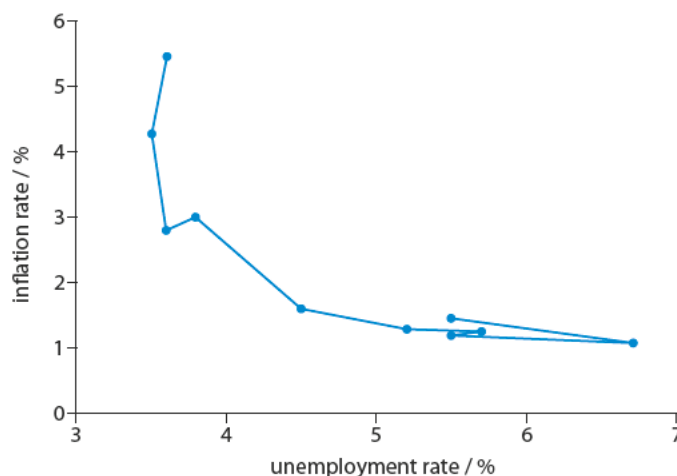


TABLE 14.5 DATA FOR AMERICA'S PHILLIPS CURVE, 1960–69

Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
UR	5.5	6.7	5.5	5.7	5.3	4.5	3.8	3.6	3.5	3.7
IR	1.46	1.07	1.2	1.24	1.28	1.59	3.01	2.78	4.27	5.46

As can be seen above, between almost every year of the decade a fall in the inflation rate corresponded with a rise in unemployment. The only exceptions were between 1962 and 1963, when both unemployment and inflation increased slightly, and between 1968



and 1969, when again both variables increased. Phillips's theory of the trade-off between unemployment and inflation was generally supported throughout most of the decade, as the downward slope of the curve in Figure 14.15 shows.

Beginning in 1970, however, data for the US began to point to a flaw in the Phillips curve theory. Throughout the decade, both unemployment and inflation rose in the US, as oil exporters in the Middle East, united under the Organization of Petroleum Exporting Countries (OPEC) cartel, placed embargoes on oil exports to the US in retaliation for America's support of Israel in a war against its Arab neighbours. The resulting supply shock in the US led to energy and petrol shortages and rising costs for US firms, forcing businesses to reduce costs by laying off workers, while simultaneously raising output prices. Several other macroeconomic variables contributed to rising unemployment and inflation in the late 1970s, including the return of tens of thousands of troops from the Vietnam War who entered the labour market and found themselves unemployed as firms reduced output in the face of rising energy costs. The Phillips curve for the 1970s told a somewhat different story about inflation and unemployment than that of the 1960s (Figure 14.16 and Table 14.6).

To access Worksheet 14.2 on the Phillips curve trade-off, please visit www.pearsonbacconline.com and follow the onscreen instructions.

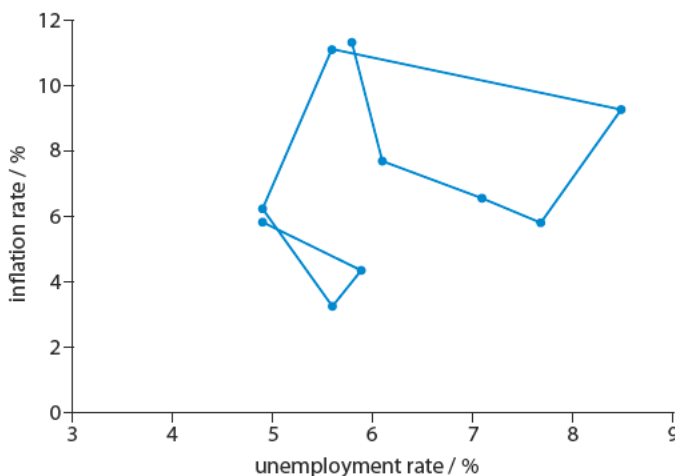


Figure 14.16
America's Phillips curve, 1970-79.

TABLE 14.6 DATA FOR AMERICA'S PHILLIPS CURVE, 1970-769										
Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
UR	4.9	5.9	5.6	4.9	5.6	8.5	7.7	7.1	6.1	5.8
IR	5.84	4.3	3.27	6.16	11.03	9.2	5.75	6.5	7.62	11.22

Between 1973 and 1974, both the unemployment rate and the inflation rate increased significantly, and even as unemployment increased by almost 3% between 1974 and 1975, the inflation rate fell by less than 2% but still remained at nearly 10%. Unlike the 1960s, the 1970s was a decade of both high unemployment *and* high inflation. By the end of the decade, unemployment was at approximately the same level as it was in 1963 (5.8%) but inflation was nearly 10 times higher (11.22% in 1979; 1.24% in 1963). The Phillips curve theory was apparently busted, as the seemingly random scattering of data in Figure 14.16 points to no discernible trade-off between unemployment and inflation throughout the 1970s.

Milton Friedman, 1912-2006.

The LRPC and the rise of monetarism

Several prominent economists in the 1970s, including Nobel Laureate Milton Friedman, revived the classical view of the macroeconomy which held that policies aimed at managing AD would ultimately be unsuccessful at decreasing unemployment in the long



Monetarism is the school of economic thought promoted by American economist Milton Friedman. It argues that changes in the money supply aimed at affecting aggregate demand will only cause inflation or deflation, but no change in the level of employment in the economy. Monetarism supports the view that the Phillips curve is vertical at the natural rate of unemployment, which is further supported by the neo-classical view of aggregate supply, which shows that regardless of the level of demand in an economy, output always returns to the full-employment level in the long run.

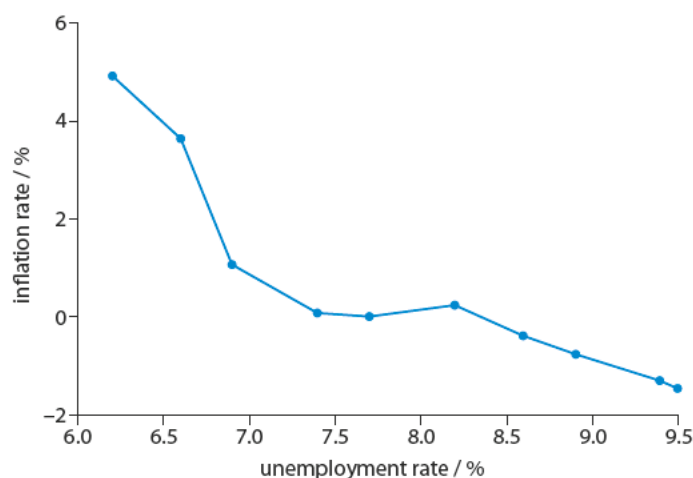


run, since a nation's output and employment would always return to the full-employment level regardless of the level of demand in the economy. Friedman, whose theory of the macroeconomy would come to be known as monetarism, believed that changes in the money supply would lead to inflation or deflation, but no change in unemployment in the long run.

Monetary policy and its effects on AD and AS are explored in depth in Chapter 18. The basic premise of the monetarists, however, was that in order to maintain stable prices and low unemployment, the nation's money supply should be permitted to grow at a steady and predictable rate, corresponding with the desired level of economic growth. Any increase in the money supply aimed at stimulating spending and AD would result in an increase in inflationary expectations, an increase in nominal wages, and a shift to the left of AS, resulting only in higher inflation and no change in real output and employment. Therefore, monetary rules were needed to ensure that policymakers would not manipulate the supply of money to try and stimulate or contract the level of AD in the economy.

By the late 1970s, the current interpretation of the Phillips theory as including both a short-run and a long-run model was widely adopted. The short-run Phillips curve may accurately illustrate the trade-off between unemployment and inflation observed in the period of time over which wages and prices are relatively inflexible in a nation's economy. For instance, during the 12-month period between July 2008 and June 2009, the level of consumption and investment in the US fell as the economy slipped into recession. Unemployment rose and inflation decreased and eventually became negative in the final three months of the period. Figure 14.17 shows the relationship between unemployment and inflation during the onset of the recession in 2008–09.

Figure 14.17
America's Phillips curve, July 2008 to June 2009.



A clear trade-off appears to have existed in the 12-month period covered by Figure 14.17. It is yet to be seen whether the unemployment rate returns to its pre-recession level in the US. Although in the short run it seems likely that the downward-sloping Phillips curve holds some truth, a look at a longer period of time for the same country tells a different story. Figure 14.18 shows the relationship between unemployment and inflation during the 12 years leading up to the onset of recession in 2008.

Looking at data for a longer period of time shows that even as inflation fluctuated between 0.5% and 4%, US unemployment remained in a relatively narrow range of between 4% and 6%. Year-on-year unemployment and inflation often increased together but at other times showed an inverse relationship as Phillips's theory predicts it should. The narrow range of unemployment portrayed in the data above is evidence that the LRPC for the US between 1997 and 2008 was more like a vertical line than a downward-sloping one. During that

To access Worksheet 14.3 on politics and the Phillips curve, please visit www.pearsonbacconline.com and follow the onscreen instructions.



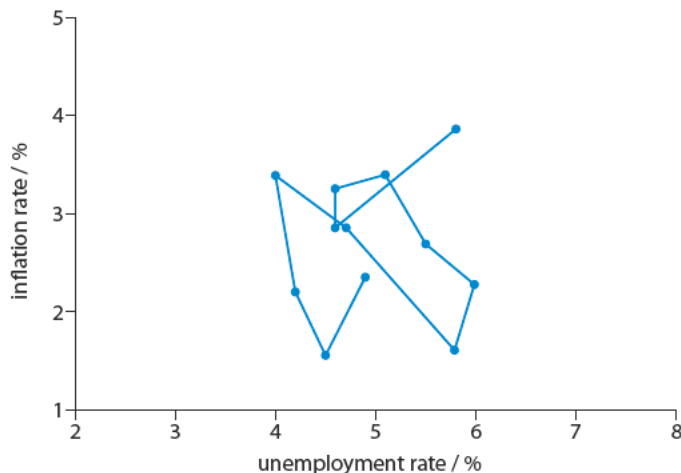


Figure 14.18
America's long-run Phillips curve, 1997–2008.

period, the unemployment rate for the US stayed around 5%; meaning that even as AD increased and decreased in the short run, the level of unemployment remained relatively steady around the natural rate of 5% in the long run.

The 1970s represented a turning point in the mainstream economic analysis of the relationship between inflation and unemployment. Demand-management policies by governments may be effective at fine-tuning an economy's employment level and price level in the short run, but as data from the 1970s and early 2000s shows, in the long run a nation's level of unemployment tends to be independent of the inflation rate, and is likely to remain around the NRU once wages and prices have adjusted to fluctuations in AD. In response to supply shocks such as the oil shortages of the 1970s, both inflation and unemployment may increase at the same time, calling into question the validity of the original Phillips curve relationship. Despite the breakdown in the relationship between unemployment and inflation in the long run, the evidence from the recession of 2008 and 2009 seems to support the theory that an economy in which AD is falling experiences a short-run trade-off between the rate of inflation and the rate of unemployment.

W To learn more about the Phillips curve, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 14.3.

PRACTICE QUESTIONS

- 1 **a** Use an AD/AS diagram to explain two possible causes of demand-pull inflation. (10 marks) [AO2], [AO4]
b Assuming a government takes no action to control demand-pull inflation, examine the likely effect it will have on a nation's economy in the long run. (15 marks) [AO3]
- 2 **a** What are the costs of a high rate of inflation? (10 marks) [AO1]
b 'What is wanted is not inflation or deflation but price stability.' Discuss. (15 marks) [AO3]
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- 3 **a** Use an AD/AS diagram to explain how cost-push inflation may occur. (10 marks) [AO2]
b Compare and contrast the effects of inflation in an economy on different stakeholders. (15 marks) [AO4]
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- 4 **a** Explain how the theory of the Phillips curve can be used to explain why it is often thought that a low level of unemployment makes an inflationary outburst inevitable. (10 marks) [AO2], [AO4]
b Examine the view that each country has a natural rate of unemployment that it will always return to in the long run. Can a nation's NRU change? If so, how? (15 marks) [AO3]

Q To access Quiz 14, an interactive, multiple-choice quiz on this chapter, please visit www.pearsonbacconline.com and follow the onscreen instructions.