

## ■ Potential GDP, Natural Unemployment, and the Business Cycle

### CHAPTER CHECKLIST

1. Explain the forces that determine potential GDP and the distribution of income between labor and other factors of production.
2. Explain what creates unemployment when the economy is at full employment and describe the influences on the natural unemployment rate.
3. Preview the aggregate supply–aggregate demand (AS-AD) model and explain why real GDP fluctuates around potential GDP.

### LECTURE TOPICS

- Potential GDP
- The Natural Unemployment Rate
- The AS-AD Model

### UNDERSTANDING MACROECONOMIC PERFORMANCE

Macroeconomists divide the variables that describe macroeconomic performance into two lists:

- Real variables
- Nominal variables

When the economy is operating at full employment, the forces that determine the real variables are independent of those that determine the nominal variables.

Away from full employment, real and monetary forces interact to bring economic fluctuations.

### ■ The Production Function

#### Production function

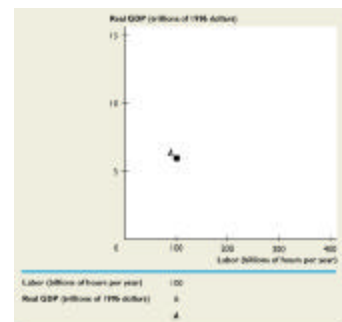
A relationship that shows the maximum quantity of real GDP that can be produced as the quantity of labor employed changes and all other influences [capital stock, technology, natural resources, organization] on production remain the same.

#### Diminishing returns

The tendency for each additional hour of labor employed to produce a successively smaller additional amount of real GDP.

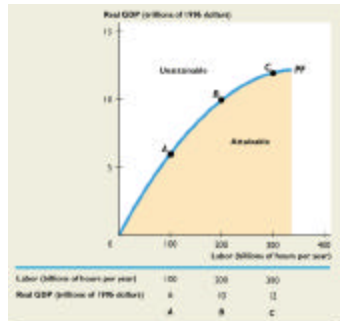
Figure 8.1 shows a stylized production function.

100 billion hours of labor can produce \$6 trillion of real GDP at point A.



200 billion hours of labor can produce \$10 trillion of real GDP at point B.

300 billion hours of labor can produce \$12 trillion of real GDP at point C.



## ■ The Labor Market

### The Demand for Labor

#### Quantity of labor demanded

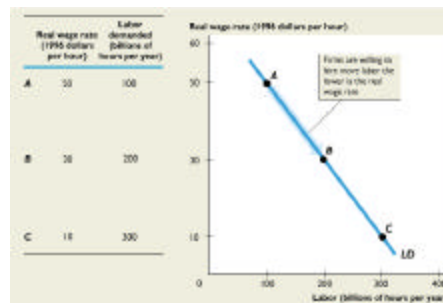
The total labor hours that all the firms in the economy plan to hire during a given time period at a **given** real wage rate; i.e. how many hours of labor all firms want to hire, **given** what the real wage rate is.

#### Demand for labor

The relationship between the quantity of labor demanded and real wage rate when all other influences on firms' hiring plans remain the same.

The lower the real wage rate, the greater is the quantity of labor demanded – just like any other demand curve. This just says that if real wages are lower, at least some firms will want to hire more hours of labor – either because output becomes more profitable so they want to produce more, or because they substitute now-cheaper labor for other inputs.

Figure 8.2 shows the demand for labor.



### The Supply of Labor

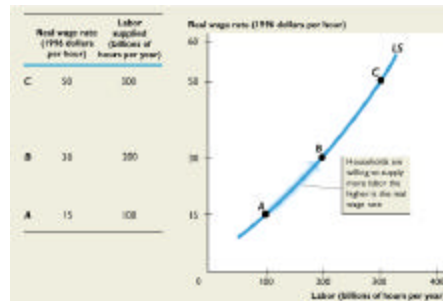
#### Quantity of labor supplied

The number of labor hours that all the households in the economy plan to work during a given time period and at a given real wage rate. How many hours all potential workers want to work, **given** the real wage rate.

#### Supply of labor

The relationship between the quantity of labor supplied and the real wage rate when all other influences on work plans remain the same.

Figure 8.3 shows the supply of labor.



The quantity of labor supplied tends to increase as the real wage rate increases for two reasons:

- Hours per person often increase as the real wage rate increases, at least for some ranges of wages [for any individual, if wages get high enough, hours they want to work tend to *decrease* as wages rise further].
- The labor force participation rate increases as the real wage rate increases. At higher wages, some people decide to enter or re-enter the labor force.

### Labor Market Equilibrium

A rise in the real wage rate eliminates a shortage of labor by decreasing the quantity demanded and increasing the quantity supplied.

A fall in the real wage rate eliminates a surplus of labor by increasing the quantity demanded and decreasing the quantity supplied.

If there is neither a shortage nor a surplus, the labor market is in equilibrium.

Figure 8.4(a) shows labor market equilibrium.

Full employment occurs when the quantity of labor demanded equals the quantity of labor supplied.



*Potential GDP* is the level of real GDP that the economy would produce if it were at full employment.

It can be thought of as the *capacity level* of the economy, the level of output that the economy is capable of producing on a sustained basis.

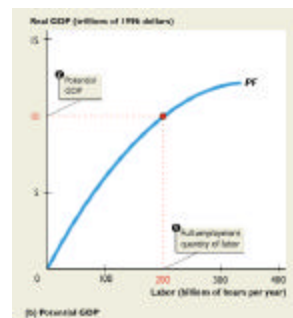
### Full Employment and Potential GDP

When the labor market is in equilibrium, the economy is at full employment and real GDP equals potential GDP.

[This is basically *definitions* – it is the jargon we use for this situation]

Figure 8.4(b) shows potential GDP.

Potential GDP is the real GDP produced on the production function by the full-employment quantity of labor.



### ■ The Functional Distribution of Income

#### Functional distribution of income

The percentage distribution of income among labor and the other factors of production.

The full-employment equilibrium enables us to explain functional distribution of income.

Labor income equals the equilibrium real wage rate multiplied by the equilibrium level of employment.

To understand the amount of frictional and structural unemployment that exists at the natural unemployment rate, economists focus on two fundamental causes of unemployment:

- Job search -- if you are looking for a job, usually you won't automatically take the first one offered – you want a 'good' job, not just 'any job.'
- Job rationing -- employers may choose to hire fewer workers than they theoretically could.

## ■ Job Search

### Job search

The activity of looking for an acceptable vacant job.

The amount [duration] of job search depends on:

- Demography – the composition of the working age population in terms of age, location, etc.
- Unemployment benefits – level and rules
- Structural change – shifts in demand for different kinds of labor

## Demographic Change

An increase in the proportion of the population that is of working age brings an increase in the entry rate into the labor force and an increase in the unemployment rate.

This factor increased the unemployment rate during the 1970s and decreased it during the 1980s.

## Unemployment Benefits

An unemployed person who receives no unemployment benefits faces a high opportunity cost of job search and has an incentive to keep job search brief.

An unemployed person who receives generous unemployment benefits faces a lower opportunity cost of job search and is therefore likely to search for longer.

In part, this may help explain differences in unemployment rates between the US and both Canada and Western Europe. In the US, only about half the unemployed qualify for unemployment compensation, and it is not very generous compared to Europe and Canada.

## Structural Change

Labor market flows and unemployment are influenced by the pace and direction of technological change and changes in the structure of international trade.

Technological change can bring a structural slump, as it did during the 1970s.

Technological change can bring a structural boom, as it did during the 1990s.

Trade liberalization, like NAFTA, may hurt some regions within the US and help others.

## ■ Job Rationing

### Job rationing

A situation that arises when the real wage rate is above the equilibrium level.

The real wage rate might be set above the equilibrium level for at least three reasons:

- Efficiency wage
- Minimum wage
- Union wage

### Efficiency Wage

If a firm pays only the going market wage, employees may have no incentive to work hard because they know that even if they are fired for shirking, they can find another job at a similar wage rate.

For this or other reasons, some firms may pay an “efficiency wage” – the firm’s estimate of its profit-maximizing wage, higher than the lowest it could get workers for.

### Efficiency wage

A real wage rate that is set above the full-employment equilibrium wage rate to induce greater work effort.

### The Minimum Wage

If the government sets a minimum wage above the equilibrium wage rate, unemployment may result.

### Union Wage

Labor unions operate in some labor markets and agree a wage with employers.

### Union wage

A wage rate that results from collective bargaining between a labor union and a firm.

### Job Rationing and Unemployment

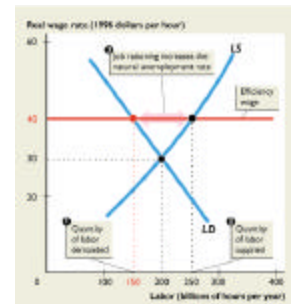
The above-equilibrium real wage rate decreases the quantity of labor demanded and increases the quantity of labor supplied.

If the prevailing real wage rate is above the full-employment equilibrium level, and held there, the natural unemployment rate will increase.

Figure 8.5 shows how job rationing increases the natural unemployment rate.

An efficiency wage rate:

1. Decreases the quantity demanded—job rationing.
2. Increases the quantity of labor supplied.
3. Increases the natural unemployment rate.



The forces that determine potential GDP provide the anchor around which real GDP fluctuates in a business cycle.

The AS-AD model explains the fluctuations around potential GDP.

The AS-AD model has three components:

- Aggregate supply
- Aggregate demand
- Macroeconomic equilibrium

- The AS – AD model is a *model*, but not quite in the same sense as the supply and demand model of the market for an individual good, to which it is analogous.
- AS – AD is more like a *metaphor*, a *framework* for thinking through how things work in the economy as a whole. We cannot observe price level or real GDP directly; there is not one ‘real wage,’ nor can we measure labor meaningfully in ‘total labor hours’ – an hour of a brain-surgeon’s work-effort is not the same as that of a hamburger-flipper. AS – AD is a huge simplification, but we will find it very useful.

■ **Aggregate Supply**

**Aggregate supply**

The relationship between the quantity of real GDP supplied and the output price level when all other influences on production plans remain the same.

Other things remaining the same, in the short run, the higher the output price level, the greater is the quantity of real GDP supplied; and the lower the output price level, the smaller is the quantity of real GDP supplied.

■ The macroeconomic short run is a period during which real GDP can differ from potential GDP.

■ The [short-run] aggregate supply curve [AS] is the relationship between the quantity of real GDP *supplied* and the *output price level* in the short-run, when the money wage, other resource [input] prices, taxes, and potential GDP remain *constant*.

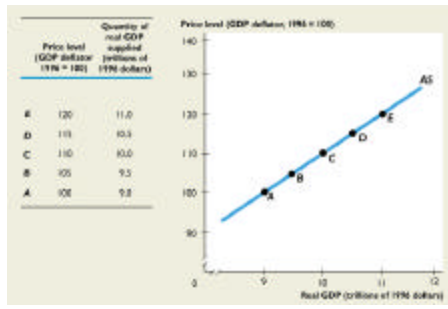
■ The short-run aggregate supply curve is upward sloping because firms' costs increase as the rate of output increases, so a higher output price makes more production profitable, and will bring forth an increase in quantity supplied.

■ The AS curve is drawn for a given *input* price level, showing how GDP output will react to different *output* price levels.

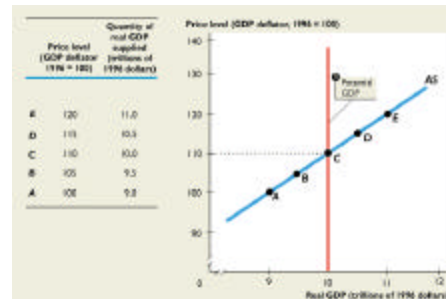
■ The idea is that there is only ONE *input* price level consistent on a sustainable [long run] basis with a given *output* price level.

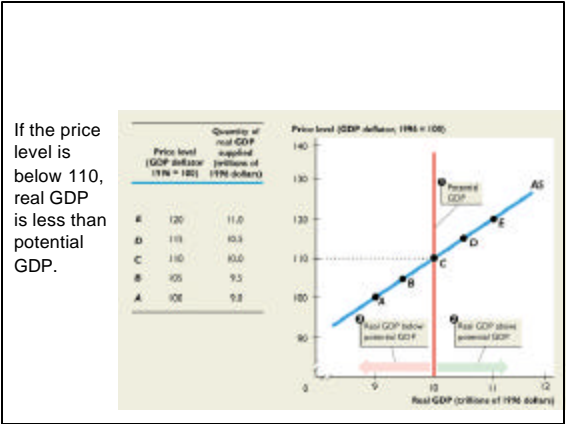
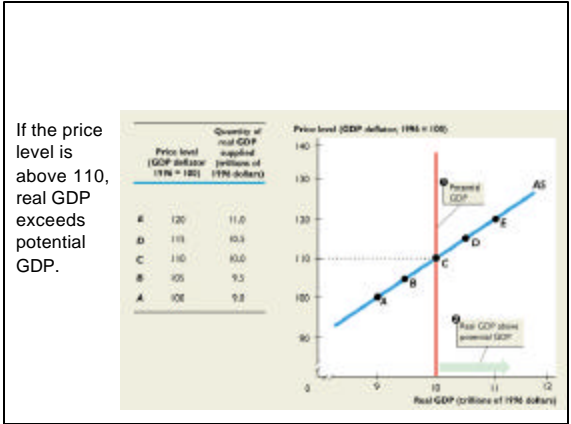
■ If something happens that upsets the relationship between input and output price levels, temporarily we will be producing away from potential at an output rate different from potential GDP.

Each point A through E on the AS curve corresponds to the row identified by the same letter in the schedule.



Potential GDP is \$10 trillion and when the price level is 110, real GDP equals potential GDP.





**Changes in Aggregate Supply**

Aggregate supply changes when potential GDP changes.

As potential GDP increases, aggregate supply increases and the AS curve shifts rightward.

Aggregate supply also changes when the money wage rate or any other money costs [input prices] such as the price of oil changes.

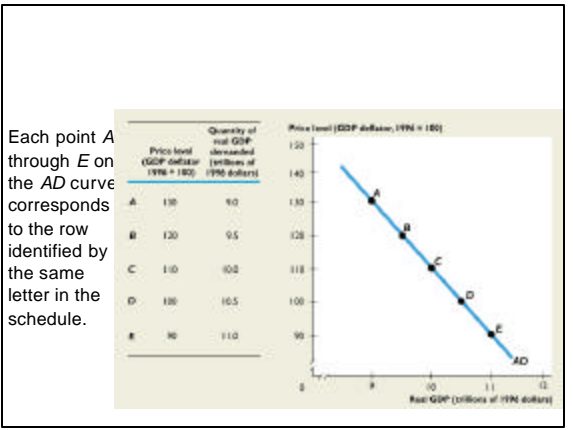
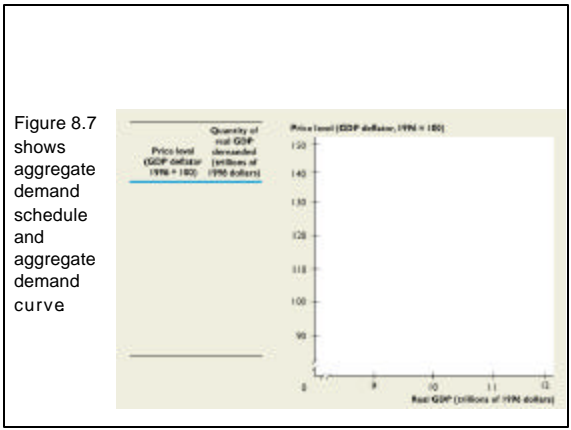
A rise in the money wage rate or in the price of oil raises firms' costs, decreases aggregate supply, and shifts the AS curve up.

**Aggregate Demand**

**Aggregate demand**

The relationship between the quantity of real GDP demanded [how much output buyers want to buy] and the output price level when all other influences on expenditure plans remain the same.

Other things remaining the same, the higher the output price level, the smaller is the quantity of real GDP demanded; and the lower the output price level, the greater is the quantity of real GDP demanded. Like an ordinary demand curve, if price goes up, how much you want to buy goes down.



- The aggregate demand curve [AD] illustrates the relationship between aggregate demand [real purchases of output] and the output price level [GDP deflator], for a given level of income and everything else.
- The aggregate demand curve shows an inverse relationship between the *output price level* and the *quantity of aggregate demand* for goods and services. Why?
  - **Wealth effect:** other things remaining the same, the higher the output price level, the smaller is the purchasing power of people's *money* assets, so consumption demand falls.
  - **Substitution effect:** other things remaining the same, a higher output price level in the US today causes demand to fall as some save more, and both US and foreign residents buy more foreign goods [whose prices have not risen] and fewer US goods.

### Changes in Aggregate Demand

Changes in the following factors change aggregate demand [details later!]:

- The interest rate
- The quantity of money
- Government purchases
- Taxes
- Real GDP in the rest of the world

### ■ Macroeconomic Equilibrium

#### Macroeconomic equilibrium

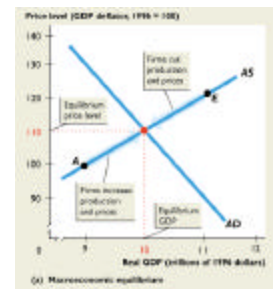
When the quantity of real GDP demanded equals the quantity of real GDP supplied, at the point of intersection of the *AD* curve and the *AS* curve.

Figure 8.8(a) shows macroeconomic equilibrium.

If the economy was at point A, firms would increase production and raise prices.

If the economy was at point E, firms would decrease production and cut prices.

The economy moves to macroeconomic equilibrium.



#### Full-employment equilibrium

When equilibrium real GDP equals potential GDP.

#### Above full-equilibrium equilibrium

When equilibrium real GDP exceeds potential GDP.

#### Below full-employment equilibrium

When potential GDP exceeds equilibrium real GDP.

Figure 8.8(b) shows three types of macroeconomic equilibrium.

As the *AD* curve fluctuates, macroeconomic equilibrium moves along the *AS* curve and traces out three types of macroeconomic equilibrium.

