

Economics

ELEVENTH EDITION

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23

ECONOMIC
GROWTH

After studying this chapter, you will be able to:

- ◆ Define and calculate the economic growth rate and explain the implications of sustained growth
- ◆ Describe the economic growth trends in the United States and other countries and regions
- ◆ Explain what makes potential GDP grow
- ◆ Explain the sources of labor productivity growth
- ◆ Explain the theories of economic growth and policies to increase its rate

U.S. real GDP per person and the standard of living tripled between 1960 and 2010.

We see even more dramatic change in China, where incomes have tripled not in 50 years but in the 13 years since 1999.

Incomes are growing rapidly in some other economies of Asia, Africa, and South America.

What are the forces that make real GDP grow?

The Basics of Economic Growth

Economic growth is the sustained expansion of production possibilities measured as the increase in real GDP over a given period.

Calculating Growth Rates

The **economic growth rate** is the annual percentage change of real GDP.

The economic growth rate tells us how rapidly the total economy is expanding.

The Basics of Economic Growth

The standard of living depends on real GDP per person.

Real GDP per person is real GDP divided by the population.

Real GDP per person grows only if real GDP grows faster than the population grows.

The Basics of Economic Growth

Economic Growth Versus Business Cycle Expansion

Real GDP can increase for two distinct reasons:

1. The economy might be returning to full employment in an expansion phase of the business cycle.
2. *Potential* GDP might be increasing.

The return to full employment in an expansion phase of the business cycle isn't economic growth.

The expansion of potential GDP is economic growth.

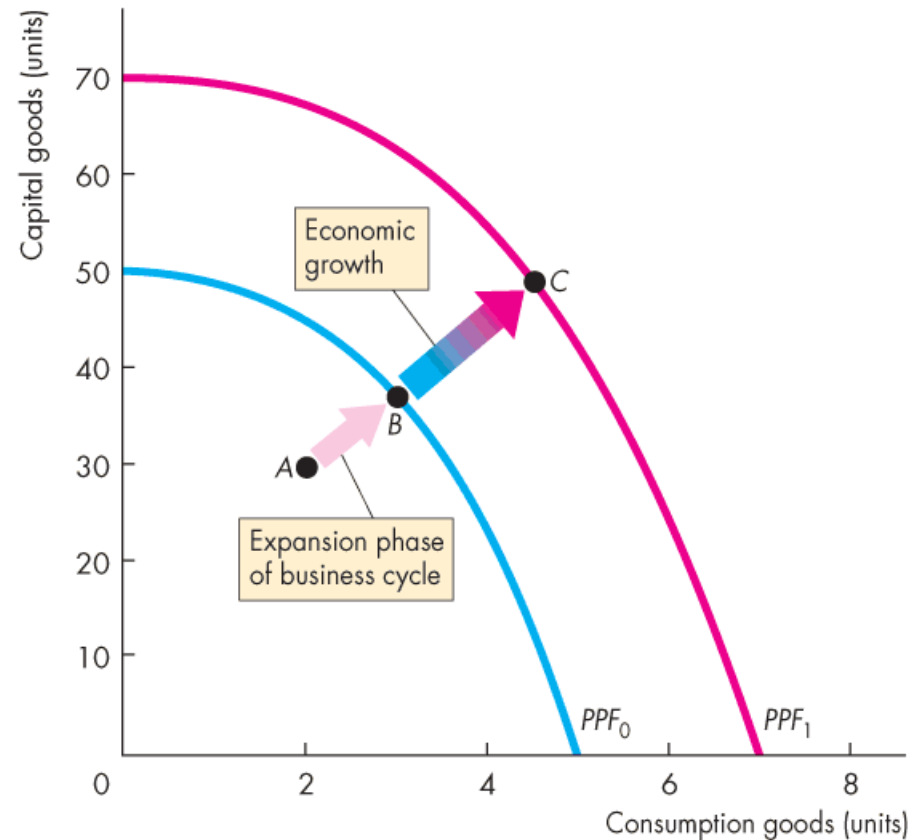
The Basics of Economic Growth



Figure 23.1 illustrates the distinction.

A return to full employment in a business cycle expansion is a movement from inside the *PPF* (point *A*) to a point on the *PPF* (point *B*).

Economic growth is the outward shift of the *PPF* from PPF_0 to PPF_1 and the movement from point *B* on PPF_0 to point *C* on PPF_1 .

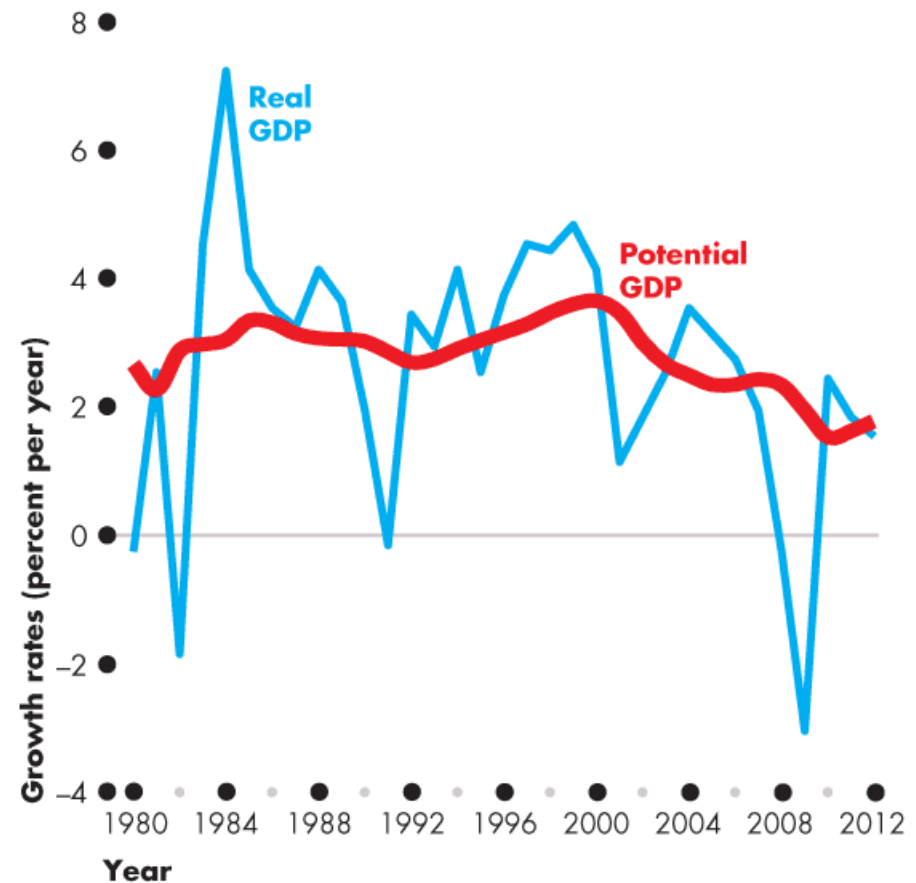


The Basics of Economic Growth



The growth rate of potential GDP measures the pace of expansion of production possibilities and ...

smoothes out the business cycle fluctuations in the growth rate of real GDP.



The Basics of Economic Growth

The Magic of Sustained Growth

The **Rule of 70** states that the number of years it takes for the level of a variable to double is approximately 70 divided by the annual percentage growth rate of the variable.

The Basics of Economic Growth



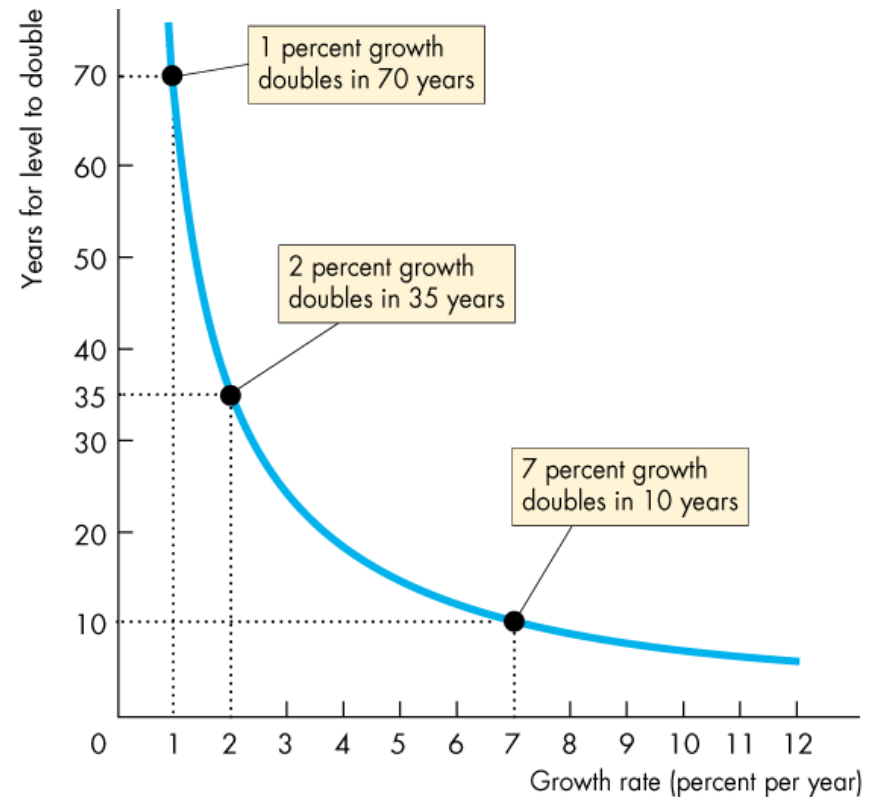
Applying the Rule of 70

Figure 23.3 shows the doubling time for growth rates.

A variable that grows at 7 percent a year doubles in 10 years.

A variable that grows at 2 percent a year doubles in 35 years.

A variable that grows at 1 percent a year doubles in 70 years.





Long-Term Growth Trends

Long-Term Growth in the U.S. Economy

From 1912 to 2012, growth in real GDP per person in the United States averaged 2 percent a year.

Real GDP per person fell precipitously during the Great Depression and rose rapidly during World War II.

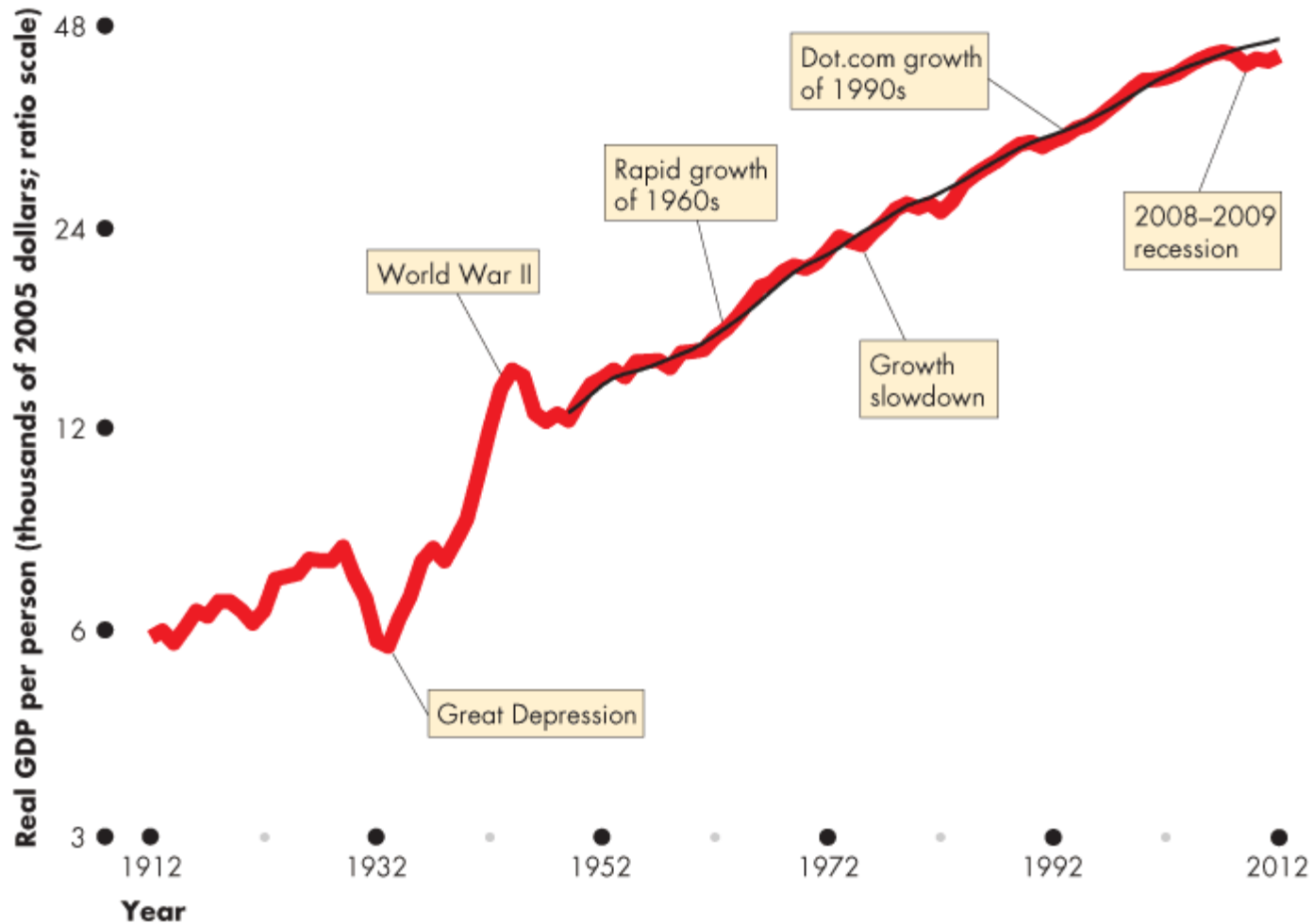
Growth was most rapid during the 1960s.

Growth slowed during the 1970s and sped up again in the 1980s and 1990s.

Figure 23.4 on the next slide illustrates.



Long-Term Growth Trends



Long-Term Growth Trends

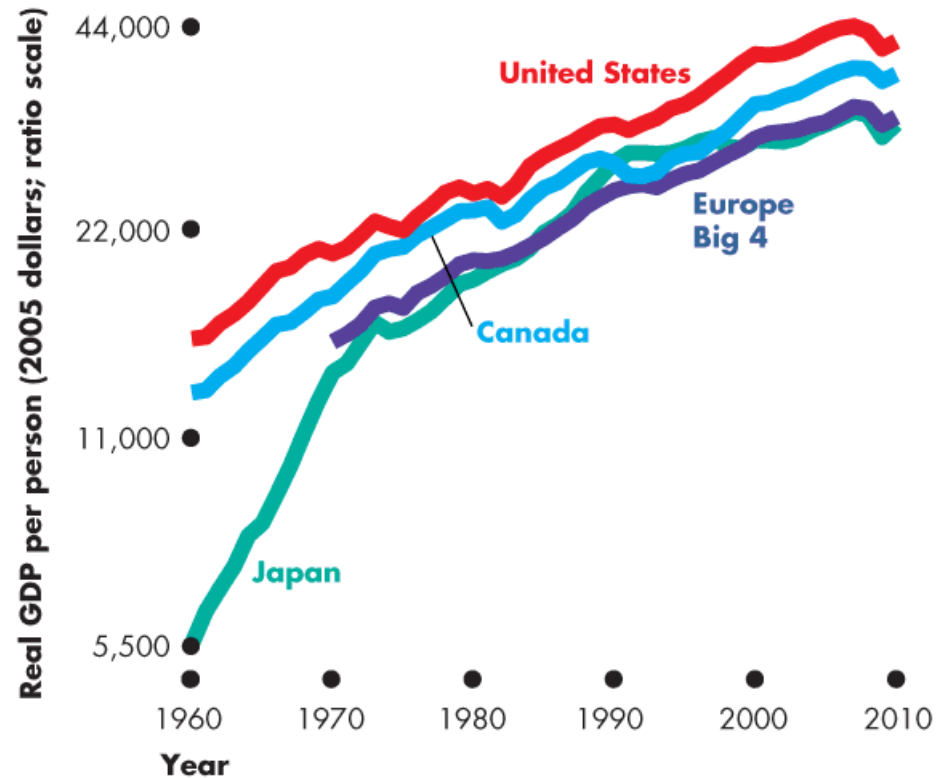


Real GDP Growth in the World Economy

Figure 23.5(a) shows the growth in the rich countries.

Japan grew rapidly in the 1960s, slower in the 1980s, and stagnated during the 1990s.

Growth in Europe Big 4, Canada, and the United States has been similar.



(a) Catch-up?

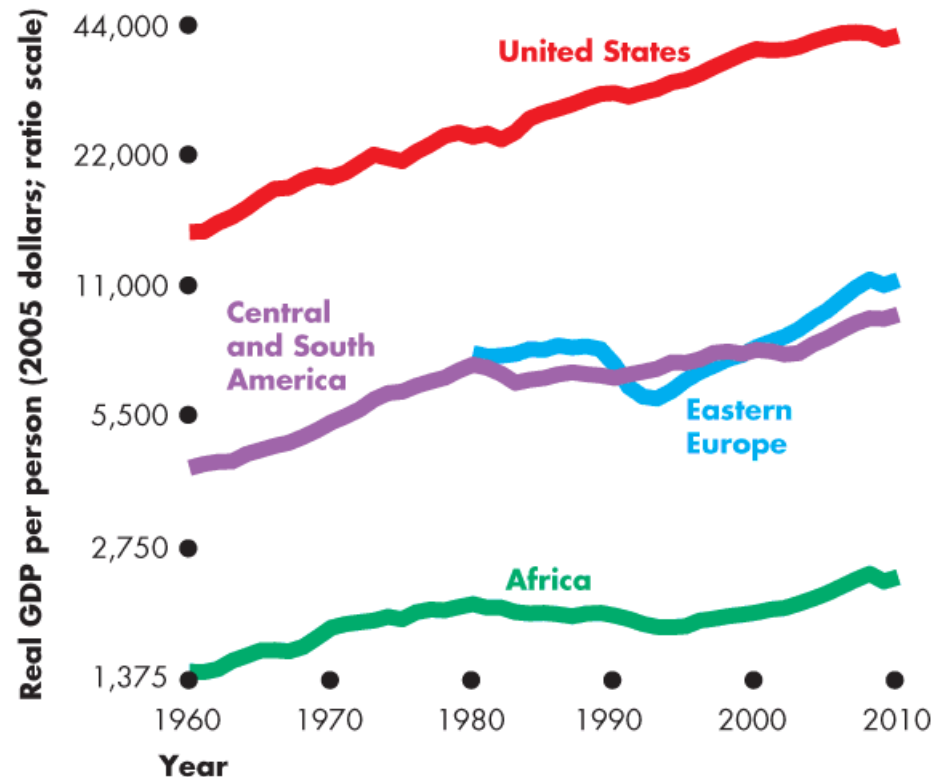


Economic Growth Trends



Figure 23.5(b) shows the growth of real GDP per person in a group of poor countries.

The gaps between real GDP per person in the United States and in these countries have widened.



(b) No catch-up?

How Potential GDP Grows

Economic growth occurs when real GDP increases.

But a one-shot increase in real GDP or a recovery from recession is not economic growth.

Economic growth is the sustained, year-on-year increase in *potential GDP*.

How Potential GDP Grows

What Determines Potential GDP?

Potential GDP is the quantity of real GDP produced when the quantity of labor employed is the full-employment quantity.

To determine potential GDP we use a model with two components:

- An aggregate production function
- An aggregate labor market

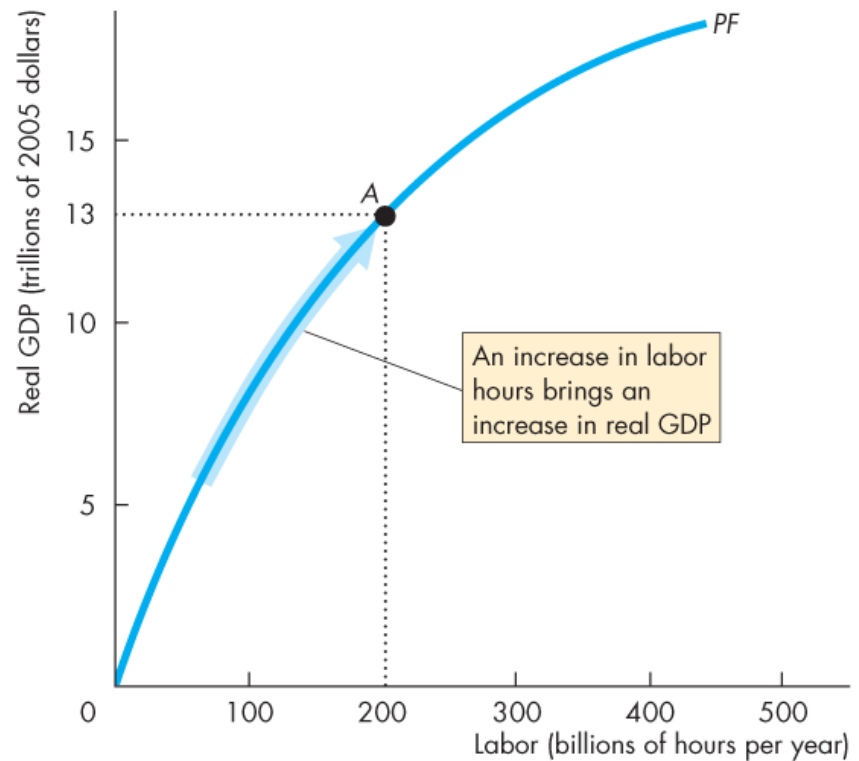
How Potential GDP Grows



Aggregate Production Function

The **aggregate production function** tells us how real GDP changes as the quantity of labor changes when all other influences on production remain the same.

An increase in labor increases real GDP.



How Potential GDP Grows

Aggregate Labor Market

The *demand for labor* shows the quantity of labor demanded and the real wage rate.

The **real wage rate** is the money wage rate divided by the price level.

The *supply of labor* shows the quantity of labor supplied and the real wage rate.

The *labor market is in equilibrium* at the real wage rate at which the quantity of labor demanded equals the quantity of labor supplied.

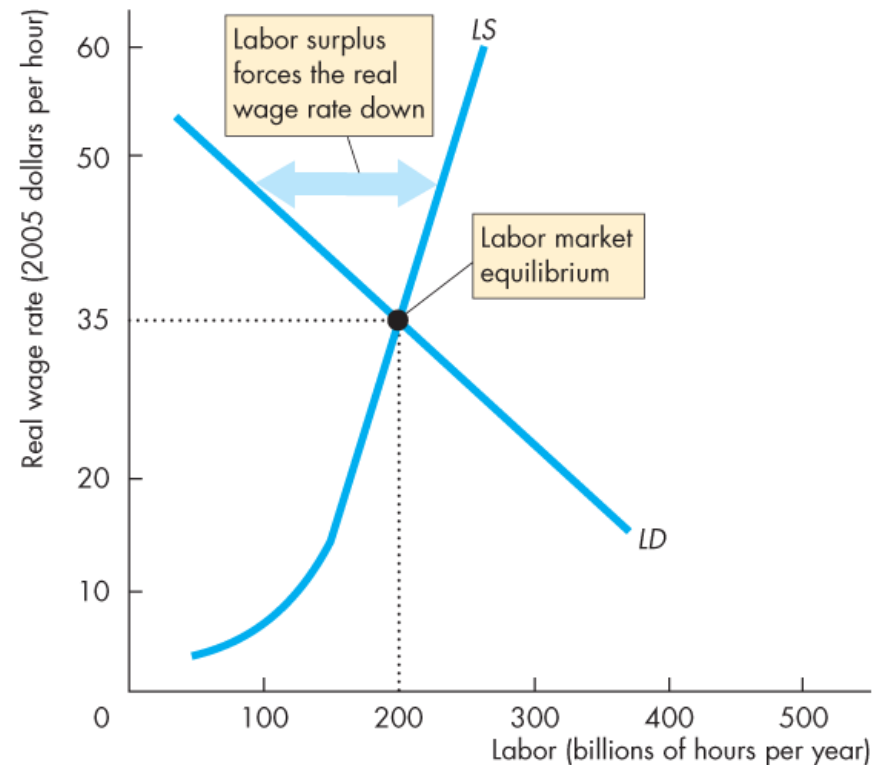
How Potential GDP Grows



Figure 23.7 illustrates labor market equilibrium.

Labor market equilibrium occurs at a real wage rate of \$35 an hour and 200 billion hours employed.

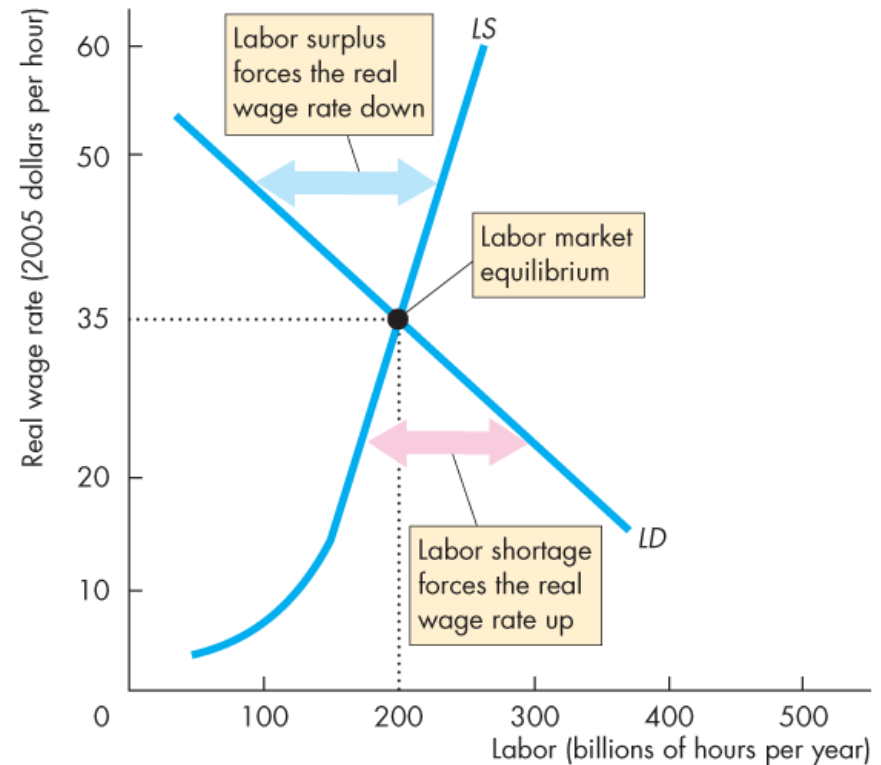
At a real wage rate above \$35 an hour, there is a surplus of labor and the real wage rate falls.



How Potential GDP Grows

At a real wage rate below \$35 an hour, there is a shortage of labor and the real wage rate rises.

At the labor market equilibrium, the economy is at *full employment*.



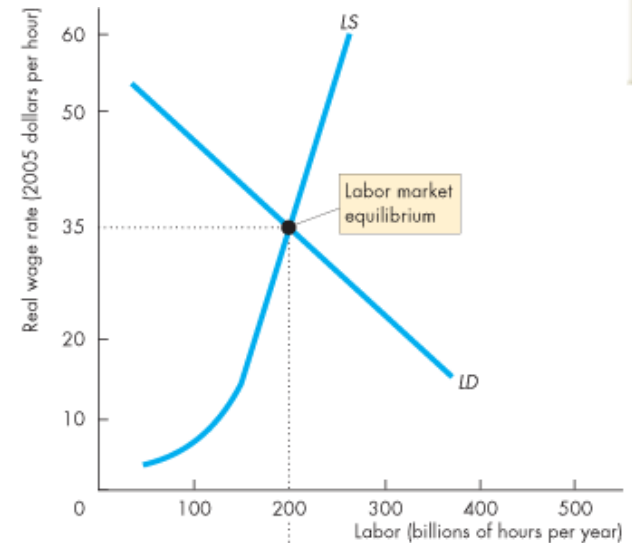
How Potential GDP Grows

Potential GDP

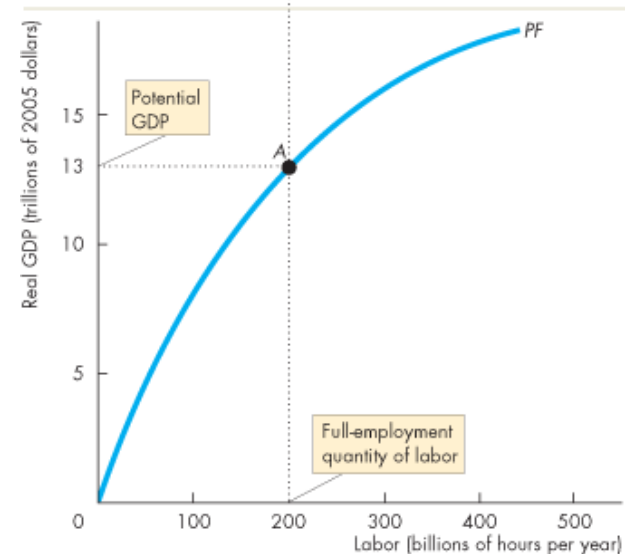
The quantity of real GDP produced when the economy is at full employment is potential GDP.

The economy is at full-employment when 200 billion hours of labor are employed.

Potential GDP is \$13 trillion.



(a) The labor market



(b) Potential GDP

How Potential GDP Grows

What Makes Potential GDP Grow?

We begin by dividing real GDP growth into the forces that increase:

- Growth in the supply of labor
- Growth in labor productivity

How Potential GDP Grows

Growth in the Supply of Labor

Aggregate hours, the total number of hours worked by all the people employed, change as a result of changes in:

1. Average hours per worker
2. Employment-to-population ratio
3. The working-age population growth

Population growth increases aggregate hours and real GDP, but to increase real GDP per person, labor must become more productive.

How Potential GDP Grows

The Effects of Population Growth

An increase in population increases the supply of labor.

With no change in the demand for labor, the equilibrium real wage rate falls and the aggregate hours increase.

The increase in the aggregate hours increases potential GDP.

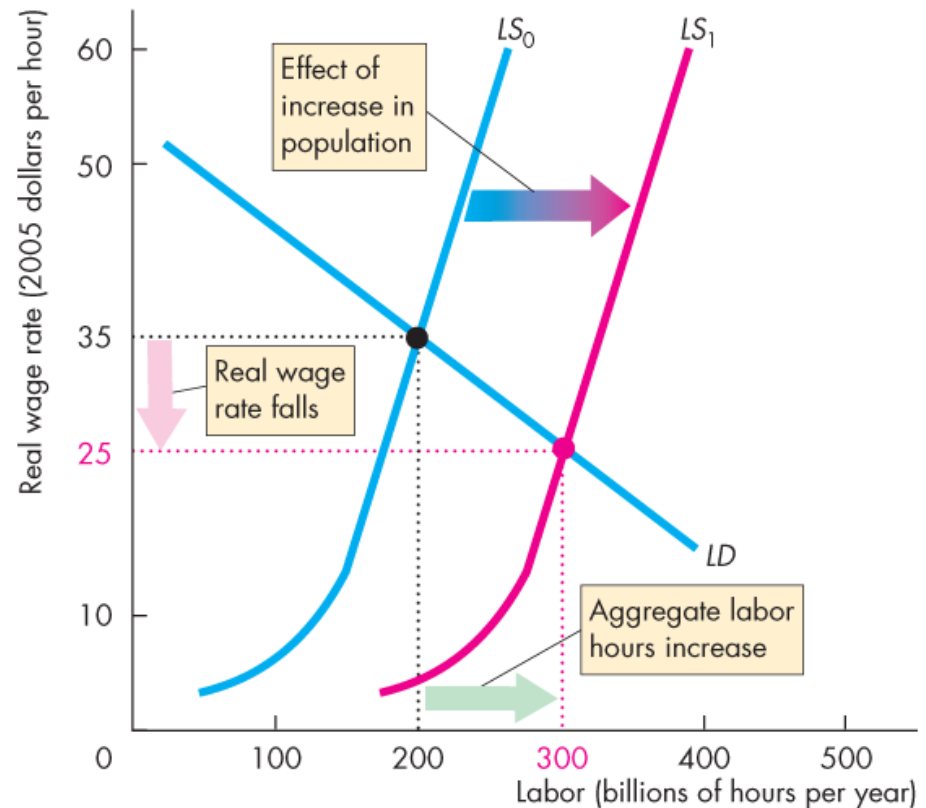
How Potential GDP Grows



Figure 23.9(a) illustrates the effects of population growth in the labor market.

The labor supply curve shifts rightward.

The real wage rate falls and aggregate hours increase.



(a) The labor market

How Potential GDP Grows

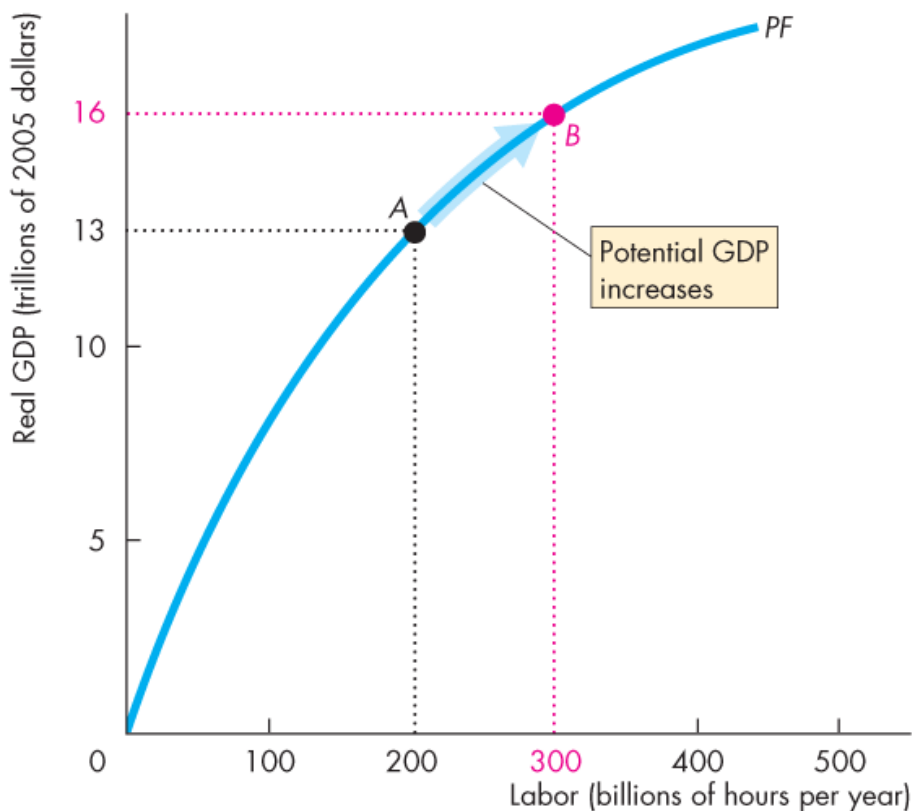


The increase in aggregate hours increases potential GDP.

Because of the diminishing returns, the increased population ...

increases real GDP,

but decreases real GDP per hour of labor.



(b) Potential GDP

How Potential GDP Grows

Growth of Labor Productivity

Labor productivity is the quantity of real GDP produced by an hour of labor.

Labor productivity equals real GDP divided by aggregate labor hours.

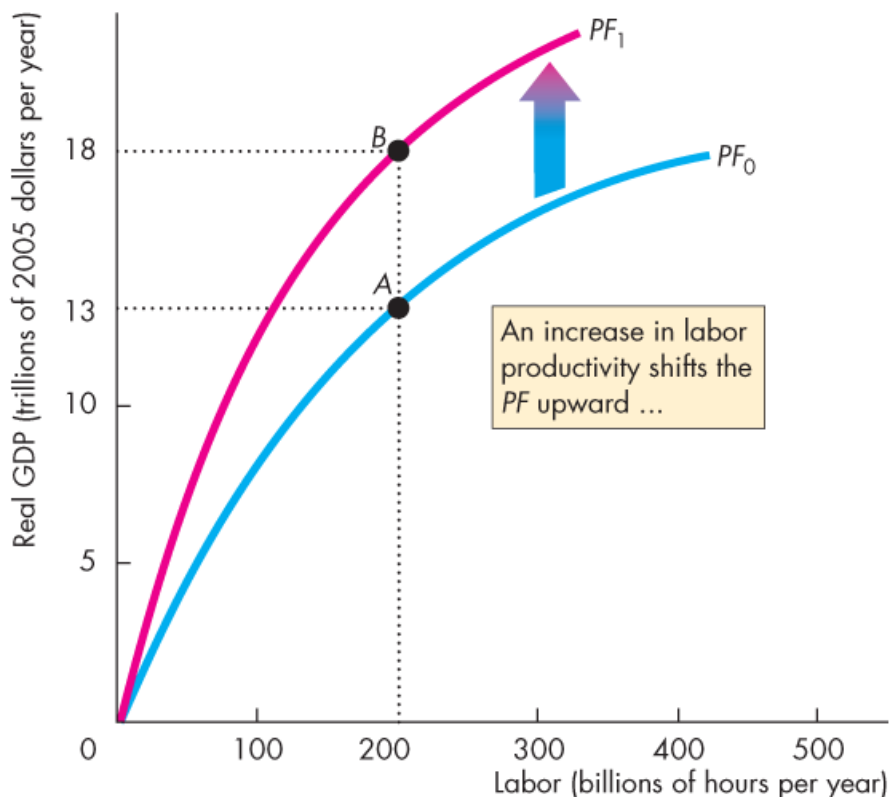
If labor becomes more productive, firms are willing to pay more for a given number of hours so the demand for labor increases.

How Potential GDP Grows



Figure 23.10 shows the effect of an increase in labor productivity.

The increase in labor productivity shifts the production function upward.



(a) Potential GDP

How Potential GDP Grows

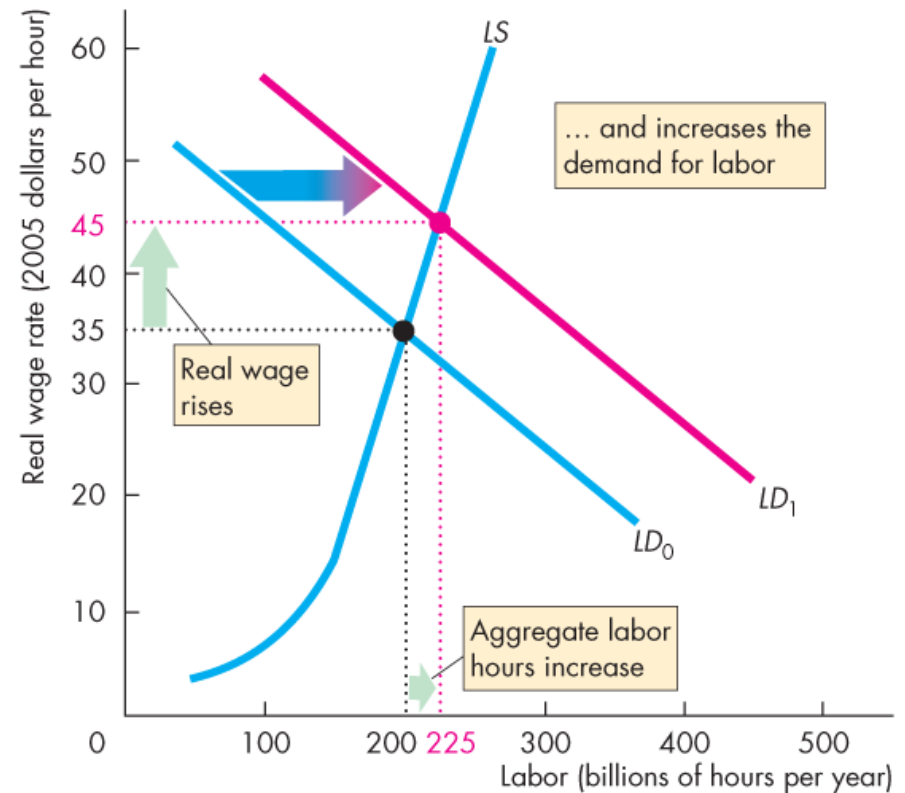


In the labor market:

An increase in labor productivity increases the demand for labor.

With no change in the supply of labor, the real wage rate rises

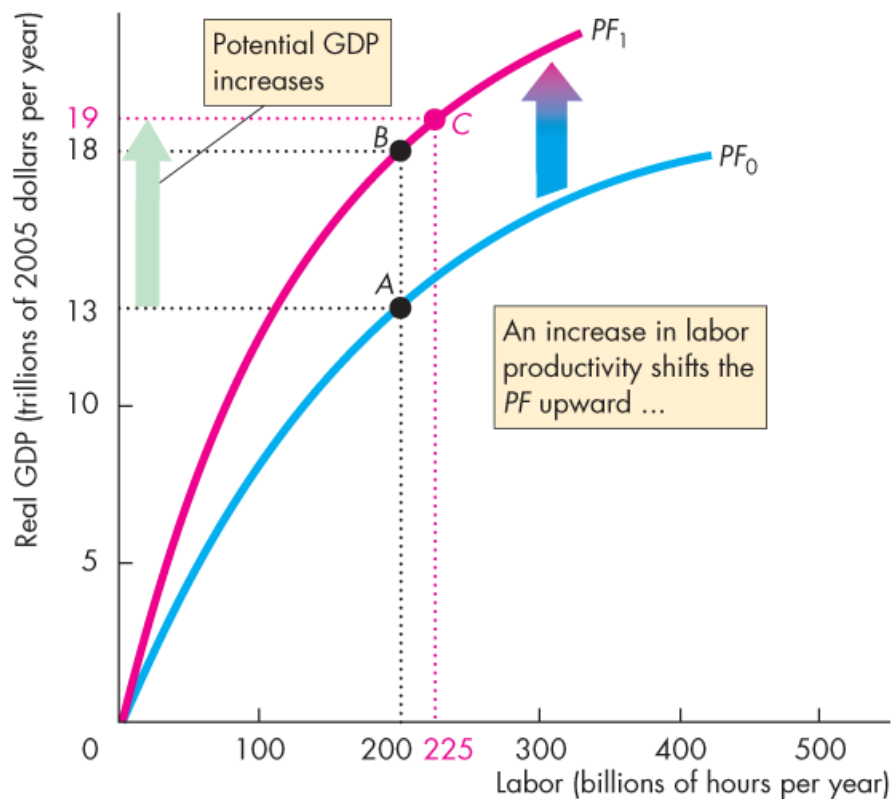
and aggregate hours increase.



(b) The labor market

How Potential GDP Grows

And with the increase in aggregate hours, potential GDP increases.



(a) Potential GDP

Why Labor Productivity Grows

Preconditions for Labor Productivity Growth

The fundamental precondition for labor productivity growth is the *incentive* system created by firms, markets, property rights, and money.

The growth of labor productivity depends on

- Physical capital growth
- Human capital growth
- Technological advances

Why Labor Productivity Grows

Physical Capital Growth

The accumulation of new capital increases capital per worker and increases labor productivity.

Human Capital Growth

Human capital acquired through education, on-the-job training, and learning-by-doing is the most fundamental source of labor productivity growth.

Why Labor Productivity Grows

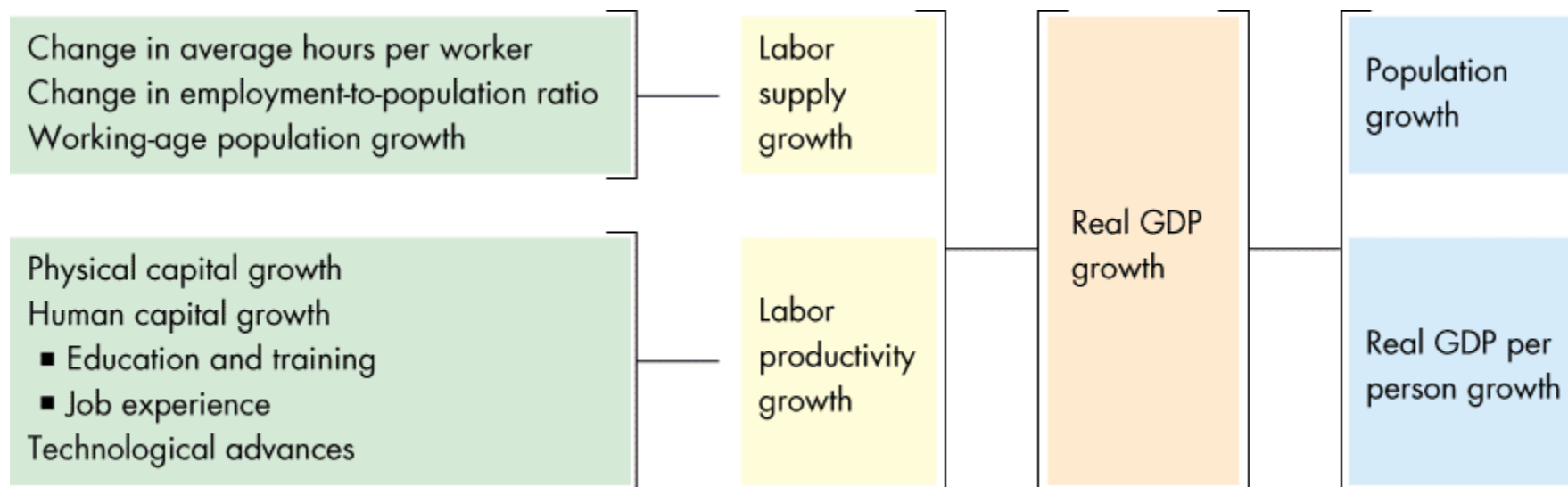
Technological Advances

Technological change—the discovery and the application of new technologies and new goods—has contributed immensely to increasing labor productivity.

Figure 23.11 on the next slide summarizes the process of growth.

It also shows that the growth of real GDP per person depends on real GDP growth and the population growth rate.

Why Labor Productivity Grows





Growth Theories, Evidence, and Policies

We study three growth theories:

- Classical growth theory
- Neoclassical growth theory
- New growth theory

Classical Growth Theory

Classical growth theory is the view that the growth of real GDP per person is temporary and that when it rises above the subsistence level, a population explosion eventually brings real GDP per person back to the subsistence level.



Growth Theories, Evidence, and Policies

Modern-Day Malthusians

Many people today are Malthusians.

They say that if today's global population of 6.9 billion explodes to 11 billion by 2050 and perhaps 35 billion by 2300, we will run out of resources, ...

real GDP per person will decline and we will return to a primitive standard of living.

We must, say Malthusians, contain population growth.



Growth Theories, Evidence, and Policies

Neoclassical Growth Theory

Neoclassical growth theory is the proposition that real GDP per person grows because technological change induces a level of saving and investment that makes capital per hour of labor grow.

Growth ends only if technological change stops because of diminishing marginal returns to both labor and capital.



Growth Theories, Evidence, and Policies

The Neoclassical Theory of Population Growth

The neoclassical view is that the population growth rate is independent of real GDP and the real GDP growth rate.

Technological Change and Diminishing Returns

In the neoclassical theory, the rate of technological change influences the economic growth rate but economic growth does not influence the pace of technological change.

It is assumed that technological change results from chance.



Growth Theories, Evidence, and Policies

Technology begins to advance at a more rapid pace.

New profit opportunities arise and investment and saving increase.

As technology advances and the capital stock grows, real GDP per person increases.

Diminishing returns to capital lower the real interest rate and eventually economic growth slows and just keeps up with population growth.

Capital per worker remains constant.



Growth Theories, Evidence, and Policies

A Problem with Neoclassical Growth Theory

All economies have access to the same technologies and capital is free to roam the globe, seeking the highest available real interest rate.

These facts imply that economic growth rates and real GDP per person across economies will converge.

Figure 23.5 shows some convergence among rich countries, but convergence doesn't appear imminent for all countries.



Growth Theories, Evidence, and Policies

New Growth Theory

New growth theory holds that real GDP per person grows because of choices that people make in the pursuit of profit and that growth can persist indefinitely.

The theory begins with two facts about market economies:

- Discoveries result from choices.
- Discoveries bring profit and competition destroys profit.



Growth Theories, Evidence, and Policies

Two further facts play a key role in the new growth theory:

- Discoveries are a public capital good.
- Knowledge is not subject to diminishing returns.

Increasing the stock of knowledge makes capital and labor more productive.

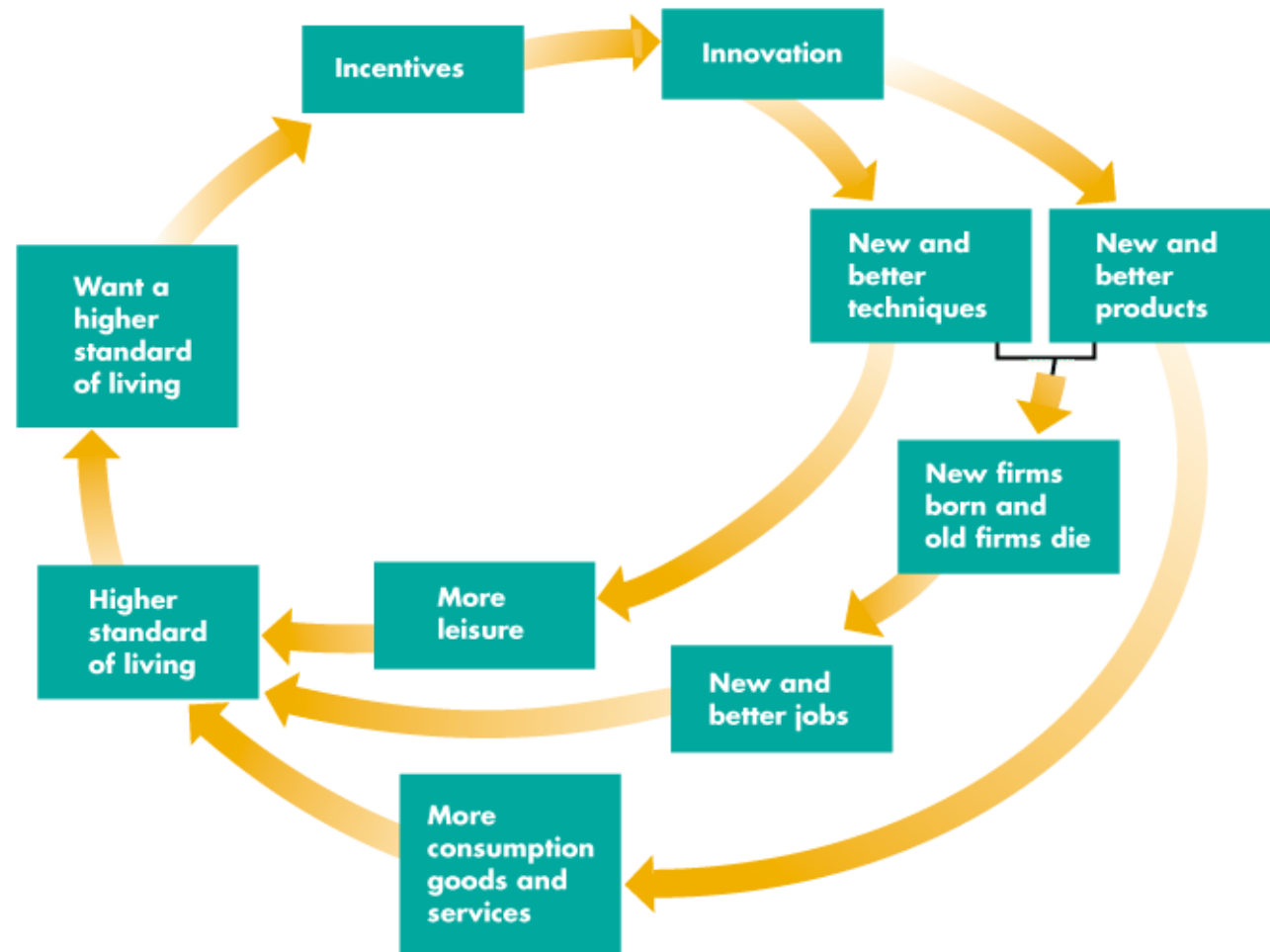
The central proposition of new growth theory is that knowledge capital does *not* experience diminishing returns.



Growth Theories, Evidence, and Policies



Figure 23.12 summarizes the ideas of new growth theory as a perpetual motion machine.





Growth Theories, Evidence, and Policies

Sorting Out the Theories

Each theory teaches us something of value but not the whole story.

Classical theory reminds us that our physical resources are limited and we need technological advances to grow.

Neoclassical theory's emphasis of diminishing returns to capital means we need technological advances to grow.

New theory emphasizes the capacity of human resources to innovate at a pace that offsets diminishing returns.



Growth Theories, Evidence, and Policies

The Empirical Evidence on the Causes of Economic Growth

Economic growth makes progress by the interplay of theory and empirical evidence.

Theory makes predictions about what we will observe if it is correct.

Empirical evidence provides the data for testing the theory.

Table 23.1 on the next slide summarizes the more robust influences on growth that economists have discovered.



Growth Theories, Evidence, and Policies

TABLE 23.1 The Influences on Economic Growth

Influence	Good for Economic Growth	Bad for Economic Growth
Region	■ Far from equator	■ Sub-Sahara Africa
Politics	■ Rule of law ■ Civil liberties	■ Revolutions ■ Military coups ■ Wars
Economic system	■ Capitalist	
Market distortions		■ Exchange rate distortions ■ Price controls and black markets
Investment	■ Human capital ■ Physical capital	
International trade	■ Open to trade	



Growth Theories, Evidence, and Policies

Policies for Achieving Faster Growth

Growth accounting tells us that to achieve faster economic growth we must either increase the growth rate of capital per hour of labor or increase the pace of technological change.

The main suggestions for achieving these objectives are:

Stimulate Saving

Saving finances investment. So higher saving rates might increase physical capital growth.

Tax incentives might be provided to boost saving.



Growth Theories, Evidence, and Policies

Stimulate Research and Development

Because the fruits of *basic* research and development efforts can be used by everyone, not all the benefit of a discovery falls to the initial discoverer.

So the market might allocate too few resources to research and development.

Government subsidies and direct funding might stimulate basic research and development.



Growth Theories, Evidence, and Policies

Improve the Quality of Education

The benefits from education spread beyond the person being educated, so there is a tendency to under invest in education.

Provide International Aid to Developing Nations

If rich countries give financial aid to developing countries, investment and growth will increase.

But data on the effect of aid shows that it has had zero or a negative effect.



Growth Theories, Evidence, and Policies

Encourage International Trade

Free international trade stimulates growth by extracting all the available gains from specialization and trade.

The fastest growing nations are the ones with the fastest growing exports and imports.