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## THE REAL ECONOMY IN THE LONG RUN





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## Production and Growth

# Production and Growth

- A country's standard of living depends on its ability to produce goods and services.

# Production and Growth

- Within a country there are large changes in the standard of living over time.

# Production and Growth

- In the United States over the past century, average income as measured by real GDP per person has grown by about 2 percent per year.

# Production and Growth

- Productivity refers to the amount of goods and services produced for each hour of a worker's time.
- A nation's standard of living is determined by the productivity of its workers.

# Table 1 The Variety of Growth Experiences

Country	Period	Real GDP per Person at Beginning of Period <sup>a</sup>	Real GDP per Person at End of Period <sup>a</sup>	Growth Rate (per year)
Japan	1890–2000	\$1,256	\$26,460	2.81%
Brazil	1900–2000	650	7,320	2.45
Mexico	1900–2000	968	8,810	2.23
Canada	1870–2000	1,984	27,330	2.04
Germany	1870–2000	1,825	25,010	2.03
China	1900–2000	598	3,940	1.90
Argentina	1900–2000	1,915	12,090	1.86
United States	1870–2000	3,347	34,260	1.81
India	1900–2000	564	2,390	1.45
Indonesia	1900–2000	743	2,840	1.35
United Kingdom	1870–2000	4,107	23,550	1.35
Pakistan	1900–2000	616	1,960	1.16
Bangladesh	1900–2000	520	1,650	1.16

<sup>a</sup>Real GDP is measured in 2000 dollars.

# ECONOMIC GROWTH AROUND THE WORLD

- Living standards, as measured by real GDP per person, vary significantly among nations.



# ECONOMIC GROWTH AROUND THE WORLD

- The poorest countries have average levels of income that have not been seen in the United States for many decades.

# ECONOMIC GROWTH AROUND THE WORLD

- Annual growth rates that seem small become large when compounded for many years.
- Compounding refers to the accumulation of a growth rate over a period of time.

# PRODUCTIVITY: ITS ROLE AND DETERMINANTS

- Productivity plays a key role in determining living standards for all nations in the world.

# Why Productivity Is So Important

- *Productivity* refers to the amount of goods and services that a worker can produce from each hour of work.

# Why Productivity Is So Important

- To understand the large differences in living standards across countries, we must focus on the production of goods and services.

# How Productivity Is Determined

- The inputs used to produce goods and services are called the factors of production.
- The factors of production directly determine productivity.

# How Productivity Is Determined

- The Factors of Production
  - Physical capital
  - Human capital
  - Natural resources
  - Technological knowledge

# How Productivity Is Determined

- *Physical Capital*
  - is a produced factor of production.
    - It is an input into the production process that in the past was an output from the production process.
  - is the stock of equipment and structures that are used to produce goods and services.
    - Tools used to build or repair automobiles.
    - Tools used to build furniture.
    - Office buildings, schools, etc.



# How Productivity Is Determined

- *Human Capital*
  - the economist's term for the knowledge and skills that workers acquire through education, training, and experience
    - Like physical capital, human capital raises a nation's ability to produce goods and services.

# How Productivity Is Determined

- *Natural Resources*
  - inputs used in production that are provided by nature, such as land, rivers, and mineral deposits.
    - Renewable resources include trees and forests.
    - Nonrenewable resources include petroleum and coal.
  - can be important but are not necessary for an economy to be highly productive in producing goods and services.

# How Productivity Is Determined

- *Technological Knowledge*
  - society's understanding of the best ways to produce goods and services.
  - Human capital refers to the resources expended transmitting this understanding to the labor force.

# FYI: The Production Function

- Economists often use a production function to describe the relationship between the quantity of inputs used in production and the quantity of output from production.

# FYI: The Production Function

- $Y = A F(L, K, H, N)$ 
  - $Y$  = quantity of output
  - $A$  = available production technology
  - $L$  = quantity of labor
  - $K$  = quantity of physical capital
  - $H$  = quantity of human capital
  - $N$  = quantity of natural resources
  - $F( )$  is a function that shows how the inputs are combined.

# FYI: The Production Function

- A production function has constant returns to scale if, for any positive number  $x$ ,

$$xY = A F(xL, xK, xH, xN)$$

- That is, a doubling of all inputs causes the amount of output to double as well.

# FYI: The Production Function

- Production functions with constant returns to scale have an interesting implication.
  - Setting  $x = 1/L$ ,
  - $Y/L = A F(1, K/L, H/L, N/L)$

Where:

$Y/L$  = output per worker

$K/L$  = physical capital per worker

$H/L$  = human capital per worker

$N/L$  = natural resources per worker

# FYI: The Production Function

- The preceding equation says that productivity ( $Y/L$ ) depends on physical capital per worker ( $K/L$ ), human capital per worker ( $H/L$ ), and natural resources per worker ( $N/L$ ), as well as the state of technology, ( $A$ ).



# ECONOMIC GROWTH AND PUBLIC POLICY

- Governments can do many things to raise productivity and living standards.

# ECONOMIC GROWTH AND PUBLIC POLICY

- Government Policies That Raise Productivity and Living Standards
  - Encourage saving and investment.
  - Encourage investment from abroad
  - Encourage education and training.
  - Establish secure property rights and maintain political stability.
  - Promote free trade.
  - Promote research and development.

# The Importance of Saving and Investment

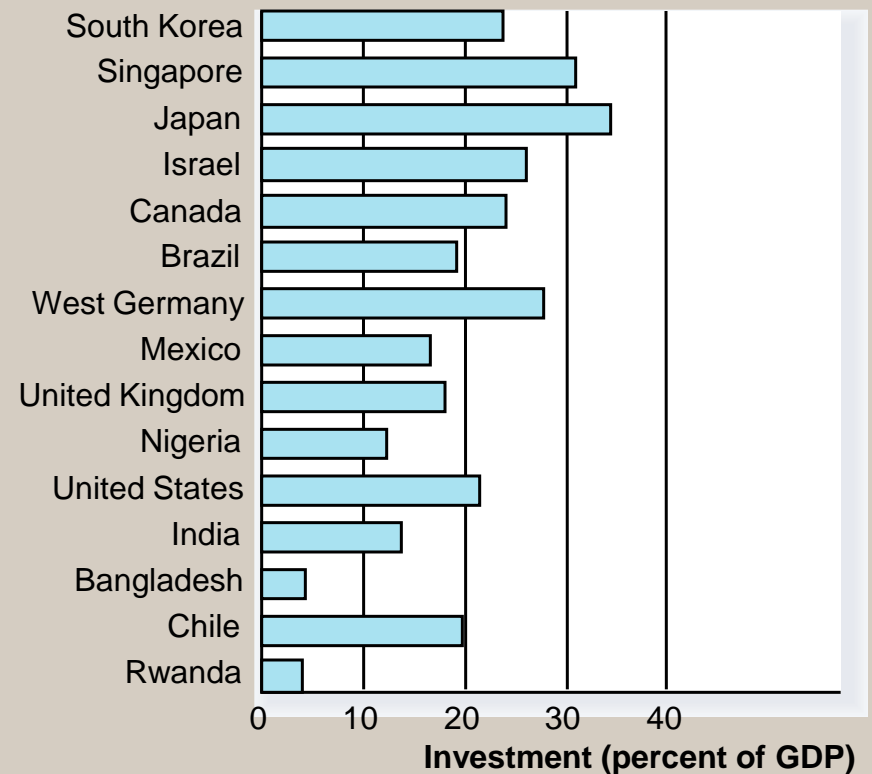
- One way to raise future productivity is to invest more current resources in the production of capital.

# Figure 1 Growth and Investment

(a) Growth Rate 1960–1991



(b) Investment 1960–1991



# Diminishing Returns and the Catch-Up Effect

- As the stock of capital rises, the extra output produced from an additional unit of capital falls; this property is called *diminishing returns*.
- Because of diminishing returns, an increase in the saving rate leads to higher growth only for a while.

# Diminishing Returns and the Catch-Up Effect

- In the long run, the higher saving rate leads to a higher level of productivity and income, but *not* to higher growth in these areas.

# Diminishing Returns and the Catch-Up Effect

- The *catch-up effect* refers to the property whereby countries that start off poor tend to grow more rapidly than countries that start off rich.

# Investment from Abroad

- Governments can increase capital accumulation and long-term economic growth by encouraging investment from foreign sources.



# Investment from Abroad

- Investment from abroad takes several forms:
  - Foreign Direct Investment
    - Capital investment owned and operated by a foreign entity.
  - Foreign Portfolio Investment
    - Investments financed with foreign money but operated by domestic residents.

# Education

- For a country's long-run growth, education is at least as important as investment in physical capital.
  - In the United States, each year of schooling raises a person's wage, on average, by about 10 percent.
  - Thus, one way the government can enhance the standard of living is to provide schools and encourage the population to take advantage of them.

# Education

- An educated person might generate new ideas about how best to produce goods and services, which in turn, might enter society's pool of knowledge and provide an external benefit to others.

# Education

- One problem facing some poor countries is the *brain drain*—the emigration of many of the most highly educated workers to rich countries.

# Property Rights and Political Stability

- *Property rights* refer to the ability of people to exercise authority over the resources they own.
  - An economy-wide respect for property rights is an important prerequisite for the price system to work.
  - It is necessary for investors to feel that their investments are secure.

# Free Trade

- Trade is, in some ways, a type of technology.
- A country that eliminates trade restrictions will experience the same kind of economic growth that would occur after a major technological advance.

# Free Trade

- Some countries engage in . . .
  - . . . *inward-orientated* trade policies, avoiding interaction with other countries.
  - . . . *outward-orientated* trade policies, encouraging interaction with other countries.

# Research and Development

- The advance of technological knowledge has led to higher standards of living.
  - Most technological advance comes from private research by firms and individual inventors.
  - Government can encourage the development of new technologies through research grants, tax breaks, and the patent system.



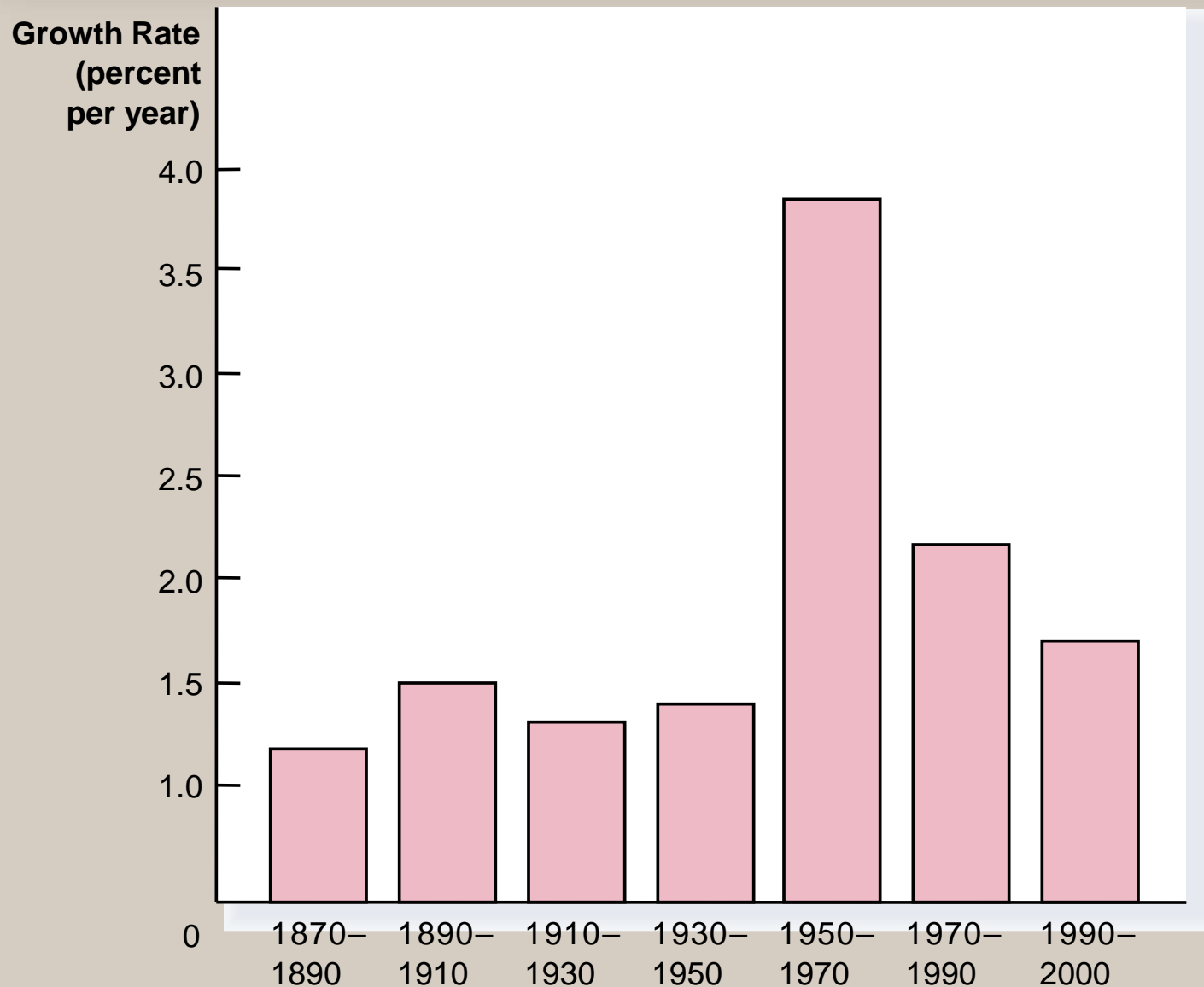
# CASE STUDY: The Productivity Slowdown and Speedup

- From 1959 to 1973 productivity grew at a rate of 3.2 percent per year.
- From 1973 to 1995 productivity grew by only 1.5 percent per year.
- Productivity accelerated again in 1995, growing by 2.6 percent per year on average during the next six years.

# CASE STUDY: The Productivity Slowdown and Speedup

- The causes of the changes in productivity growth are elusive.
- The slowdown cannot be traced to the factors of production that are most easily measured.
- Many economists attribute the slowdown and speedup in economic growth to changes in technology and the creation of new ideas.

## Figure 2 The Growth in Real GDP Per Person



# Population Growth

- Economists and other social scientists have long debated how population growth affects a society

# Population Growth

- Population growth interacts with other factors of production:
  - Stretching natural resources
  - Diluting the capital stock
  - Promoting technological progress

# Summary

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- Economic prosperity, as measured by real GDP per person, varies substantially around the world.
- The average income of the world's richest countries is more than ten times that in the world's poorest countries.
- The standard of living in an economy depends on the economy's ability to produce goods and services.

# Summary

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- Productivity depends on the amounts of physical capital, human capital, natural resources, and technological knowledge available to workers.
- Government policies can influence the economy's growth rate in many different ways.

# Summary

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- The accumulation of capital is subject to diminishing returns.
- Because of diminishing returns, higher saving leads to a higher growth for a period of time, but growth will eventually slow down.
- Also because of diminishing returns, the return to capital is especially high in poor countries.