Chapter 12 – Production and Growth

# Economic Growth around the World

## Table 1 shows data on real income per person for 13 countries during different periods of time.

### The data reveal the fact that living standards vary a great deal between these countries.

### Growth rates are also reported in the table. China has had the largest growth rate over time, 2.64% per year (on average).

### Because of different growth rates, the ranking of countries by income per person changes over time.

#### In the late 19th century, the United Kingdom was the richest country in the world.

#### Today, income per person is lower in the United Kingdom than in the United States (a former colony of the United Kingdom).

## FYI: Are You Richer Than the Richest American?

### According to the magazine *American Heritage*, the richest American of all time is John B. Rockefeller, whose wealth today would be the equivalent of approximately $250 billion.

### Yet, because Rockefeller lived from 1839 to 1937, he did not get the chance to enjoy many of the conveniences we take for granted today such as television, air conditioning, and modern medicine.

### Thus, because of technological advances, the average American today may enjoy a “richer” life than the richest American who lived a century ago.

# Productivity: Its Role and Determinants

## Why Productivity Is So Important

### Example: Robinson Crusoe

#### Because he is stranded alone, he must catch his own fish, grow his own vegetables, and make his own clothes.

#### His standard of living depends on his ability to produce goods and services.

### Definition of productivity: the quantity of goods and services produced from each unit of labor input.

### Review of Principle #8: A Country’s Standard of Living Depends on Its Ability to Produce Goods and Services.

## How Productivity Is Determined

### Physical Capital per Worker

#### Definition of physical capital: the stock of equipment and structures used to produce goods and services.

#### Example: Crusoe will catch more fish if he has more fishing poles.

### Human Capital per Worker

#### Definition of human capital: the knowledge and skills that workers acquire through education, training, and experience.

#### Example: Crusoe will catch more fish if he has been trained in the best fishing techniques or as he gains experience fishing.

### Natural Resources per Worker

#### Definition of natural resources: the inputs into production that are provided by nature, such as land, rivers, and mineral deposits.

#### Example: Crusoe will have better luck catching fish if there is a plentiful supply around his island.

### Technological Knowledge

#### Definition of technological knowledge: society’s understanding of the best ways to produce goods and services.

#### Example: Crusoe will catch more fish if he has invented a better fishing lure.

## FYI: The Production Function

### A production function describes the relationship between the quantity of inputs used in production and the quantity of output from production.

### The production function generally is written like this:



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

### Many production functions have a property called constant returns to scale.

#### This property implies that as all inputs are doubled, output will exactly double.

#### This implies that the following must be true:



#### where *x* = 2 if inputs are doubled.

#### This also means that if we want to examine output per worker we could set *x* = 1/*L* and we would get the following:



#### This shows that output per worker depends on the amount of physical capital per worker (*K*/*L*), the amount of human capital per worker (*H*/*L*), and the amount of natural resources per worker (*N*/*L*).

### Case Study: Are Natural Resources a Limit to Growth?

#### This section points out that as the population has grown over time, we have discovered ways to lower our use of natural resources. Thus, most economists are not worried about shortages of natural resources.

# Economic Growth and Public Policy

## Saving and Investment

### Because capital is a produced factor of production, a society can change the amount of capital that it has.

### However, there is an opportunity cost of doing so; if resources are used to produce capital goods, fewer goods and services are produced for current consumption.

## Diminishing Returns and the Catch-Up Effect

### Definition of diminishing returns: the property whereby the benefit from an extra unit of an input declines as the quantity of the input increases.

#### As the capital stock rises, the extra output produced from an additional unit of capital will fall. This is known as the *diminishing marginal product of capital*.

#### This can be seen in Figure 1, which shows how the amount of capital per worker determines the amount of output per worker, holding constant all other determinants of output.

#### Thus, if workers already have a large amount of capital to work with, giving them an additional unit of capital will not increase their productivity by much.

#### In the long run, a higher saving rate leads to a higher level of productivity and income, but not to higher growth rates in these variables.

### An important implication of diminishing returns is the catch-up effect.

#### Definition of catch-up effect: the property whereby countries that start off poor tend to grow more rapidly than countries that start off rich.

#### When workers have very little capital to begin with, an additional unit of capital will increase their productivity by a great deal.

## Investment from Abroad

### Saving by domestic residents is not the only way for a country to invest in new capital.

### Investment in the country by foreigners can also occur.

#### Foreign direct investment occurs when a capital investment is owned and operated by a foreign entity.

#### Foreign portfolio investment occurs when a capital investment is financed with foreign money but operated by domestic residents.

### Some of the benefits of foreign investment flow back to foreign owners. But the economy still experiences an increase in the capital stock, which leads to higher productivity and higher wages.

### The World Bank is an organization that tries to encourage the flow of investment to poor countries.

#### The World Bank obtains funds from developed countries such as the United States and makes loans to less-developed countries so that they can invest in roads, sewer systems, schools, and other types of capital.

#### The World Bank also offers these countries advice on how best to use these funds.

## Education

### Investment in human capital also has an opportunity cost.

#### When students are in class, they cannot be producing goods and services for consumption.

#### In less-developed countries, this opportunity cost is considered to be high; as a result, children often drop out of school at a young age.

### Because there are positive externalities in education, the effect of lower education on the economic growth rate of a country can be large.

### Many poor countries also face a “brain drain”—the best educated often leave to go to other countries where they can enjoy a higher standard of living.

## Health and Nutrition

### Human capital can also be used to describe another type of investment in people: expenditures that lead to a healthier population.

### Other things being equal, healthier workers are more productive.

### Making the right investments in the health of the population is one way for a nation to increase productivity.

## Property Rights and Political Stability

### Protection of property rights and promotion of political stability are two other important ways that policymakers can improve economic growth.

### There is little incentive to produce products if there is no guarantee that they cannot be taken. Contracts must also be enforced.

### Countries with questionable enforcement of property rights or an unstable political climate will also have difficulty in attracting foreign (or even domestic) investment.

## Free Trade

### Some countries have tried to achieve faster economic growth by avoiding transacting with the rest of the world.

### However, trade allows a country to specialize in what it does best and thus consume beyond its production possibilities.

### When a country trades wheat for steel, it is as well off as it would be if it had developed a new technology for turning wheat into steel.

### The amount a nation trades is determined not only by government policy but also by geography.

#### Countries with good, natural seaports find trade easier than countries without this resource.

#### Countries with more than 80 percent of their population living within 100 kilometers of a coast have an average GDP per person that is four times as large as countries with less than 20 percent of their population living near a coast.

## Research and Development

### The primary reason why living standards have improved over time has been due to large increases in technological knowledge.

### Knowledge can be considered a public good.

### The U.S. government promotes the creation of new technological information by providing research grants and providing tax incentives for firms engaged in research.

### The patent system also encourages research by granting an inventor the exclusive right to produce the product for a specified number of years.

### Ask the Experts: Innovation and Growth

#### When asked whether future innovations worldwide would not be transformational enough to promote sustained per capita economic growth rates in the US and western Europe in the future as in the past, 59 percent of economic experts were uncertain, while 7 percent agreed and 34 percent disagreed.

## Population Growth

### Stretching Natural Resources

#### Thomas Malthus (an English minister and early economic thinker) argued that an ever-increasing population meant that the world was doomed to live in poverty forever.

#### However, he failed to understand that new ideas would be developed to increase the production of food and other goods, including pesticides, fertilizers, mechanized equipment, and new crop varieties.

### Diluting the Capital Stock

#### High population growth reduces GDP per worker because rapid growth in the number of workers forces the capital stock to be spread more thinly.

#### Countries with a high population growth have large numbers of school-age children, placing a burden on the education system.

#### Some countries have already instituted measures to reduce population growth rates.

#### Policies that foster equal treatment for women should raise economic opportunities for women leading to lower rates of population.

### Promoting Technological Progress

#### Some economists have suggested that population growth has driven technological progress and economic prosperity.

#### In a 1993 journal article, economist Michael Kremer provided evidence that increases in population lead to technological progress.

### Case Study: “Why Is So Much of Africa Poor?”

#### People in sub-Saharan Africa produce GDP per person that is just 23% of the world average.

#### Factors that contribute to Africa’s poverty are low capital investment, low educational attainment, poor health, high population growth, restricted freedom, corruption, and a legacy of colonization.

## In the News: The Secret Sauce of American Prosperity

### Martin Feldstein argues that the U.S. produces more per person than other advanced economies in Europe for a number of reasons.

### Schumpeter would argue that the lower production in Europe is due to the growth of the welfare state.