25 Production and Growth

PRINCIPLES OF
ECONOMICS
FOURTH EDITION

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In this chapter, look for the answers to these questions:

- What are the facts about living standards and growth rates around the world?
- Why does productivity matter for living standards?
- What determines productivity and its growth rate?
- How can public policy affect growth and living standards?

Incomes and Growth Around the World

	GDP per capita, 2005	*Growth rate, 1960-2005*
China	$6,572	5.8%
Singapore	29,921	5.4%
Japan	30,821	3.8%
Spain	26,125	3.2%
India	3,486	2.7%
Israel	25,670	2.7%
United States	41,854	2.2%
Canada	32,886	2.1%
Colombia	7,769	1.8%
New Zealand	22,511	1.4%
Philippines	4,920	1.4%
Argentina	14,421	1.0%
Saudi Arabia	14,729	0.8%
Rwanda	1,333	0.3%
Haiti	1,836	–1.2%

Incomes and Growth Around the World

Since growth rates vary, the country rankings can change over time:

- Poor countries are not necessarily doomed to poverty forever – *e.g.*, Singapore, incomes were low in 1960 and are quite high now.
- Rich countries can't take their status for granted: They may be overtaken by poorer but faster-growing countries.

Incomes and Growth Around the World

Questions:

§ Why are some countries richer than others?

§ Why do some countries grow quickly while others seem stuck in a poverty trap?

§ What policies may help raise growth rates and long-run living standards?

Productivity

§ Recall one of the Ten Principles from Chapter 1: *A country's standard of living depends on its ability to produce g & s.*

§ This ability depends on **productivity**:

§ **Y** = real GDP = quantity of output produced
L = quantity of labor
so productivity =

Why Productivity Is So Important

§ When a nation's workers are very productive,

§ When productivity grows rapidly,

§ What, then, determines productivity and its growth rate?

Physical Capital Per Worker

§ Recall: The stock of equipment and structures used to produce g&s is called **[physical] capital**, denoted **K**.

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§ Productivity is higher when the average worker has more capital (machines, equipment, etc.).

§ *i.e.*,

Human Capital Per Worker

§ **Human capital** (**H**):

§ **H/L** = the average worker's human capital

§ Productivity is higher when the average worker has more human capital (education, skills, etc.).

§ *i.e.*,

Natural Resources Per Worker

§ **Natural resources** (**N**):

§ Other things equal,
more **N** allows a country to produce more **Y**.
In per-worker terms,

§ Some countries are rich because they have abundant natural resources
(*e.g.,* Saudi Arabia has lots of oil)

§ But countries need not have much **N** to be rich
(*e.g.,* Japan imports the **N** it needs).

Technological Knowledge

§ **Technological knowledge**:

§ Technological progress does not only mean a faster computer, a higher-definition TV, or a smaller cell phone.

§ It means

Tech. Knowledge vs. Human Capital

§ Technological knowledge refers to

§ Human capital results from

§ Both are important for productivity.

The Production Function

§ The production function is

F( ) – a function that shows how inputs are combined to produce output

"**A**" –

§ "**A**" multiplies the function **F**( ), so improvements in technology (increases in "**A**")

The Production Function

$$Y = A\,F(L, K, H, N)$$

§ The production function has the property **constant returns to scale**:

§ Doubling all inputs (multiplying each by 2) causes output to double:

$$2Y = A\,F(2L, 2K, 2H, 2N)$$

The Production Function

$$Y = A\,F(L, K, H, N)$$

§ If we multiply each input by $1/L$,

§ This equation shows that productivity (output per worker) depends on:

ACTIVE LEARNING 1:
Discussion question

Which of the following policies do you think would be most effective at boosting growth and living standards in a poor country over the long run?

a. offer tax incentives for investment by local firms
b. …by foreign firms
c. give cash payments for good school attendance
d. crack down on govt corruption
e. restrict imports to protect domestic industries
f. allow free trade
g. give away condoms

19

ECONOMIC GROWTH AND PUBLIC POLICY

Next, we look at the ways public policy can affect long-run growth in productivity and living standards.

Saving and Investment

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§ Since resources scarce, producing more capital requires producing fewer consumption goods.

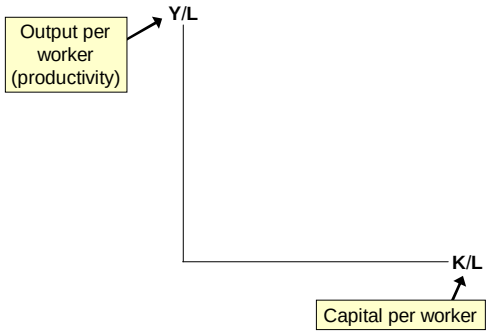
§ Reducing consumption = increasing saving. This extra saving funds the production of investment goods. *(More details in the next chapter.)*

§ Hence, a tradeoff between current and future consumption.

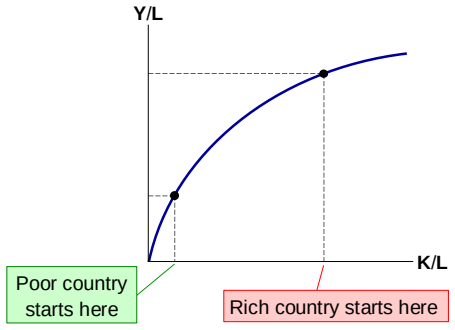
Diminishing Returns and the Catch-Up Effect

§ The govt can implement policies that raise saving and investment. *(Details in next chapter.)* Then **K** will rise, causing productivity and living standards to rise.

The Production Function & Diminishing Returns



The catch-up effect:



Example of the Catch-Up Effect

- Over 1960-1990, the U.S. and S. Korea devoted a similar share of GDP to investment, so you might expect they would have similar growth performance.
- But growth was >6% in Korea and only 2% in the U.S.
- Explanation:

Investment from Abroad

- To raise **K/L** and hence productivity, wages, and living standards, the govt can also encourage
  - **Foreign direct investment**:
  - **Foreign portfolio investment**:
- Some of the returns from these investments

Investment from Abroad

- Especially beneficial in poor countries that cannot generate enough saving to fund investment projects themselves.
- Also

Education

- Govt can increase productivity by
- Education has significant effects: In the U.S., each year of schooling
- But investing in **H** also involves a tradeoff between the present & future: Spending a year in school requires sacrificing a year's wages now to have higher wages later.

Health and Nutrition

- In countries with significant malnourishment, raising workers' caloric intake raises productivity:
  - Over 1962-95, caloric consumption rose 44% in S. Korea, and economic growth was spectacular.
  - Nobel winner Robert Fogel: 30% of Great Britain's growth from 1790-1980 was due to improved nutrition.

Property Rights and Political Stability

- Recall: *Markets are usually a good way to organize economic activity.* The price system allocates resources to their most efficient uses.

- This requires

Property Rights and Political Stability

- In many poor countries, the justice system doesn't work very well:
  - contracts aren't always enforced
  - fraud, corruption often go unpunished
  - in some, firms must bribe govt officials for permits
- Political instability (*e.g.,* frequent coups) creates uncertainty over whether property rights will be protected in the future.

Property Rights and Political Stability

- When people fear their capital may be stolen by criminals or confiscated by a corrupt govt,
- Economic stability, efficiency, and healthy growth require

Free Trade

- **Inward-oriented policies**
- **Outward-oriented policies**

Free Trade

§ Recall: *Trade can make everyone better off.*

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§ Countries with inward-oriented policies have generally failed to create growth.
- *e.g.,* Argentina during the 20th century.

§ Countries with outward-oriented policies have often succeeded.
- *e.g.,* South Korea, Singapore, Taiwan after 1960.

Research and Development

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§ One reason is that knowledge is a **public good**: Ideas can be shared freely, increasing the productivity of many.

§ Policies to promote tech. progress:

Population Growth

…may affect living standards in 3 different ways:

1. Stretching natural resources

§ 200 years ago, Malthus argued

§ Since then, the world population has increased sixfold. If Malthus was right, living standards would have fallen. Instead, they've risen.

§ Malthus failed to account for

Population Growth

2. Diluting the capital stock

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§ This applies to **H** as well as **K**:

§ Countries with fast pop. growth tend to have lower educational attainment.

Population Growth

2. Diluting the capital stock

To combat this, many developing countries

Population Growth

3. Promoting tech. progress

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§ Evidence from Michael Kremer:
Over the course of human history,
- growth rates increased as the world's population increased
- more populated regions grew faster than less populated ones

ACTIVE LEARNING 2:
Productivity

- List the determinants of productivity.
- List three policies that attempt to raise living standards by increasing one of the determinants of productivity.

40

Are Natural Resources a Limit to Growth?

- Some argue that population growth is depleting the Earth's non-renewable resources, and thus will limit growth in living standards.
- But
  - Hybrid cars use less gas.
  - Better insulation in homes reduces the energy required to heat or cool them.
- As a resource becomes scarcer,

CONCLUSION

- In the long run, living standards are determined by productivity.
- Policies that affect the determinants of productivity will therefore affect the next generation's living standards.
- One of these determinants is saving and investment.
- In the next chapter, we will learn how saving and investment are determined, and how policies can affect them.