

# CHAPTER 25

## Production and Growth

### PRINCIPLES OF Economics

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Premium PowerPoint Slides  
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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?

## The variety of growth experiences

Country	Period	Real GDP per person at beginning of period	Real GDP per person at end of period	Growth rate (per year)
Japan	1890–2006	\$1,408	\$33,150	2.76%
Brazil	1900–2006	729	8,880	2.39
China	1900–2006	670	7,740	2.34
Mexico	1900–2006	1,085	11,410	2.24
Germany	1870–2006	2,045	31,830	2.04
Canada	1870–2006	2,224	34,610	2.04
Argentina	1900–2006	2,147	15,390	1.88
United States	1870–2006	3,752	44,260	1.83
India	1900–2006	632	3,800	1.71
United Kingdom	1870–2006	4,502	35,580	1.53
Indonesia	1900–2006	834	3,950	1.48
Bangladesh	1900–2006	583	2,340	1.32
Pakistan	1900–2006	690	2,500	1.22

# Productivity

- Recall one of the Ten Principles from Chap. 1:  
*A country's standard of living depends on its ability to produce g&s.*
- This ability depends on \_\_\_\_\_, the average quantity of g&s produced per unit of labor input.
- \_\_\_\_\_ = quantity of output produced  
\_\_\_\_\_ so productivity = \_\_\_\_\_ (**output per worker**)

# Why Productivity Is So Important

- When a nation's workers are very productive, real GDP is large and incomes are high.
- When productivity grows rapidly, so do living standards.
- 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**.
- $K/L = \underline{\hspace{10em}}$ .
- Productivity is higher when the average worker has more capital (machines, equipment, etc.).
- *i.e.*,  
an increase in **K/L** causes an **increase** in **Y/L**.

# Human Capital Per Worker

- **Human capital (H):**  
the **knowledge and skills** workers acquire through education, training, and experience
- **H/L** = the average worker's human capital
- Productivity is higher when the average worker has more human capital (education, skills, etc.).
- *i.e.*,  
an increase in **H/L** causes an **increase** in **Y/L**.

# Natural Resources Per Worker

- **Natural resources** (**N**): the inputs into production that **nature** provides, e.g., land, mineral deposits
- Other things equal,  
more **N** allows a country to produce more **Y**.  
In per-worker terms,  
an increase in **N/L** causes an increase in **Y/L**.
- 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**: society's understanding of the best ways to produce g&s
- Technological progress **does not** only mean a faster computer, a higher-definition TV, or a smaller cell phone.
- It means any advance in knowledge that **boosts** productivity (allows society to get more output from its resources).
  - *E.g.*, Henry Ford and the assembly line.

# Tech. Knowledge vs. Human Capital

- Technological knowledge refers to society's understanding of how to produce g&s.
- Human capital results from the effort people expend to acquire this knowledge.
- Both are important for productivity.

## ACTIVE LEARNING 1

### Discussion Question

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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

# Saving and Investment

- We can boost productivity by increasing **K**, which \_\_\_\_\_.
- Since resources are 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

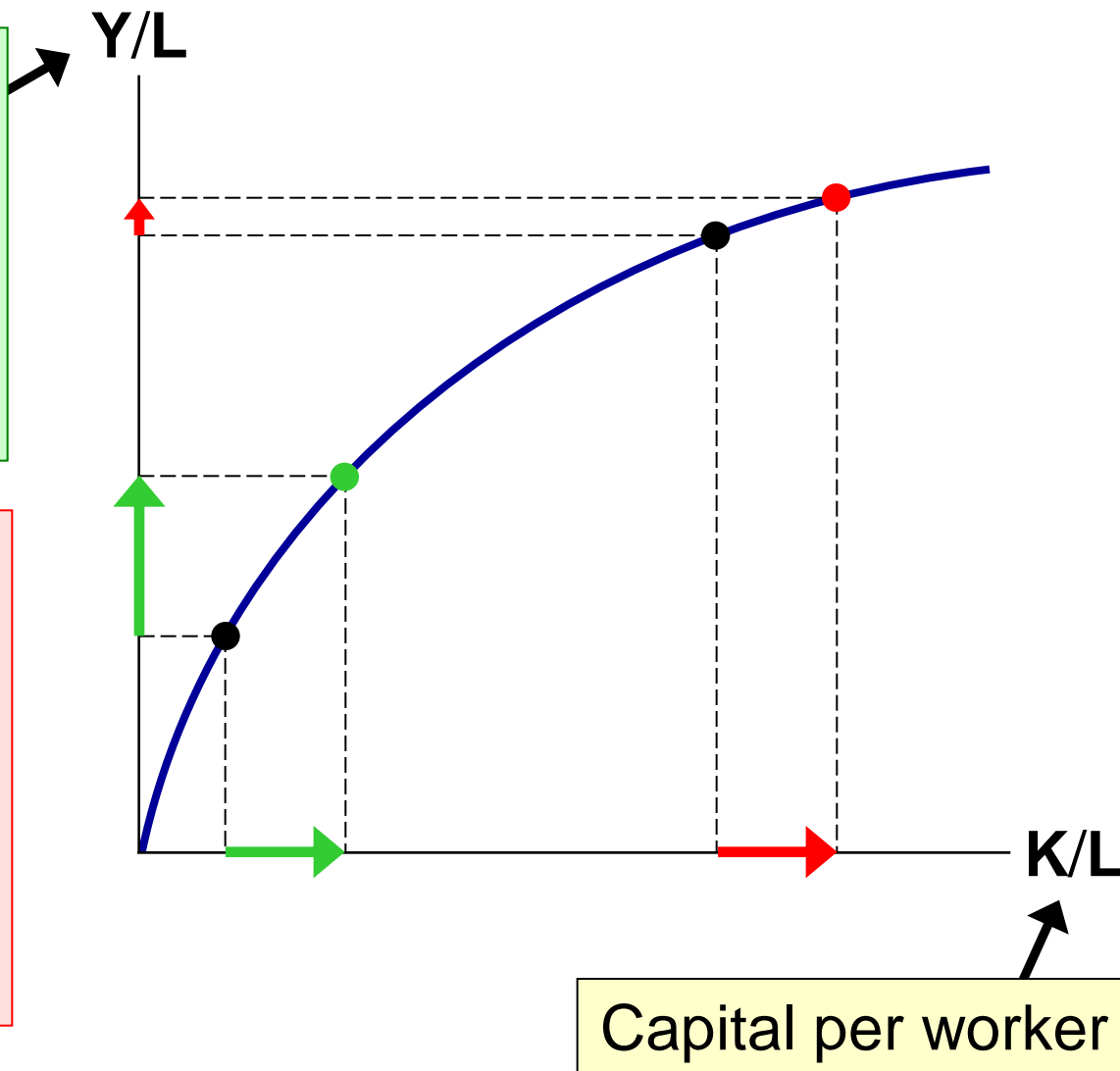
- The govt can implement policies that raise saving and investment. (*Details in next chapter.*)  
Then **K** will rise, causing productivity and  

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- But this faster growth is temporary,  
due to **diminishing returns to capital**:  
As **K** rises, the extra output from an additional  
unit of **K** falls....

# The Production Function & Diminishing Returns

If workers have little  $K$ , giving them more increases their productivity a lot.

If workers already have a lot of  $K$ , giving them more increases productivity fairly little.





# 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: the catch-up effect.  
In 1960,  $K/L$  was far smaller in Korea than in the U.S., hence Korea grew faster.



# Investment from Abroad

- To raise **K/L** and hence productivity, wages, and living standards, **the govt can also encourage**
  - \_\_\_\_\_:  
a capital investment (*e.g.*, factory) that is owned & operated by a foreign entity
  - \_\_\_\_\_:  
a capital investment financed with foreign money but operated by domestic residents
- Some of the returns from these investments flow back to the foreign countries that supplied the funds.

# Investment from Abroad

- Especially beneficial in poor countries that cannot generate enough saving to fund investment projects themselves.
- Also helps poor countries learn state-of-the-art technologies developed in other countries.

# Education

- Govt can increase productivity by promoting education—investment in \_\_\_\_\_(**H**).
  - Public schools, subsidized loans for college
- Education has significant effects: In the U.S., each year of schooling raises a worker's wage by 10%.
- 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

- Health care expenditure is a type of investment in human capital – healthier workers are more **productive**.
- 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 respect for \_\_\_\_\_, the ability of people to exercise authority over the resources they own.

# 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    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, there is less investment, including from abroad, and the economy functions less efficiently.  
Result: lower living standards.
- Economic stability, efficiency, and healthy growth require law enforcement, effective courts, a stable constitution, and honest govt officials.

# Free Trade

- Protectionist policies (e.g., tariffs, limits on investment from abroad) aim to raise living standards by avoiding interaction with other countries.
- Liberalization policies (e.g., the elimination of restrictions on trade or foreign investment) promote integration with the world economy.



# Free Trade

- Recall: *Trade can make everyone better off.*
- Trade has similar effects as discovering new technologies – it improves productivity and living standards.
- 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

- **Technological progress** is the main reason why living standards rise over the long run.
- One reason is that knowledge is a **public good**: Ideas can be shared freely, increasing the productivity of many.
- Policies to promote tech. progress:
  - Patent laws
  - Tax incentives or direct support for private sector R&D
  - Grants for basic research at universities

# Population Growth

...may affect living standards in 3 different ways:

## 1. Stretching natural resources

- 200 years ago, Malthus argued that pop. growth would strain society's ability to provide for itself.
- 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 technological progress and productivity growth.

# Population Growth

## 2. Diluting the capital stock

- Bigger population = higher  $L$  = lower  $K/L$   
= lower productivity & living standards.
- This applies to  $H$  as well as  $K$ :  
fast pop. growth = more children  
= greater strain on educational system.
- Countries with fast pop. growth tend to have lower educational attainment.

# Population Growth

## 2. Diluting the capital stock

To combat this, many developing countries use policy to control population growth.

- China's one child per family laws
- Contraception education & availability
- Promote female literacy to raise opportunity cost of having babies

# Population Growth

## 3. Promoting tech. progress

- More people
  - = more scientists, inventors, engineers
  - = more frequent discoveries
  - = faster tech. progress & economic growth
- 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

# Review productivity concepts

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

# ACTIVE LEARNING 2

## Answers

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### Determinants of productivity:

**K/L**, physical capital per worker

**H/L**, human capital per worker

**N/L**, natural resources per worker

**A**, technological knowledge

### Policies to boost productivity:

- \_\_\_\_\_, to raise **K/L**
- \_\_\_\_\_, to raise **K/L**
- \_\_\_\_\_, to raise **H/L**



# Policy to Increase Savings

- A National Sales (Consumption) Tax (*FairTax* book by Linder and Boortz) would be a 23% tax on all NEW goods and services that a \_\_\_\_\_.
- The FairTax is \_\_\_\_\_, which means it will bring in the same amount of revenue as the income tax system today.
  - This includes Social Security and Medicare (expected benefits paid out exceed tax revenues by close to \$100 trillion)
    - To make up for a debt of this magnitude, it would take all of the following: raise income taxes by 17%, raise payroll taxes by 24%, cut federal purchases by 26%, and cut Social Security and Medicare benefits by 11%.
    - Today there are about 4 payees for every 1 beneficiary, but by the year 2030 there will only be 2 payees for every 1 beneficiary. (*Coming Generational Storm*)
- In the first year alone output per person in the US would grow by 17% more than it would under the current tax system, savings would be higher, and we could increase our standards of living at a far greater pace than our current system allows.

# Consumption Tax

- All other federal taxes would be \_\_\_\_\_, which include:
  1. The individual income tax (the average income tax is close to 42% here in America when you take into account the progressive marginal income tax brackets, Social Security taxes of 12.4% (6.2% paid by employer and employee), Medicare taxes of 2.9% (1.45% paid by both), and a host of other taxes)
  2. Capital Gains and Dividends taxes (this would be a boost in today's economy with falling house prices and a tremendous slowdown in investment here in the US. Currently these taxes are at 15% for both)
  3. Estate Taxes- 45% this year with current legislation
  4. Corporate and business income taxes
    - Corporate income taxes are the second highest in the developed world at 35%
    - There is no business to business tax under the Fair Tax.
      - =>The current imbedded tax that we find in all of our final goods and services that we purchase is 22%.
      - =>Therefore, a pair of jeans that cost \$45 would only go up to about \$45.22 once the Fair Tax is put in place due to the reduction of costs to businesses from not paying corporate taxes.

# Benefits of Consumption Tax

1. We start collecting 100% of our earnings on every paycheck
2. We all start receiving monthly pre-bates equal to the amount of consumption tax we would be expected to pay on life's basic necessities (i.e. food)
3. We all start saving and investing without any tax consequences, no double taxation
4. American business return operations to the US
5. Close down the IRS
6. No more wasted dollars on complying with a tax code (this is estimated to be between \$500-600 billion a year)
7. Underground economy finally start paying taxes
  - the underground economy is estimated to be 10% of GDP, or close to \$1.5 trillion that is never taxed. (*Reefer Madness*)

# Concerns about Consumption Tax

1. \_\_\_\_\_ those with higher incomes at a lower tax rate since they consume a lower percentage of their income than lower income individuals.
2. Would not be revenue neutral.
3. Would favor savings over consumption.
4. Would have to \_\_\_\_\_, which gave the federal government the authority to tax income.
  - The first tax was put in place during the Civil War for only the “rich” of 3%.
  - The 16<sup>th</sup> amendment was passed in 1913 (same year as the Federal Reserve Act) and was only a 7% tax on “rich”.
  - The top tax rate went up to 91% during WWII, JFK lowered them to 70%, Regan lowered them to 28%, Bush, Sr. and Clinton raised it and Bush, Jr. lowered it to the current 35%.

# 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 technological progress often yields ways to avoid these limits:
  - Hybrid cars use less gas.
  - Better insulation in homes reduces the energy required to heat or cool them.
- As a resource becomes scarcer, its market price rises, which increases the incentive to conserve it and develop alternatives.
- Are We Running Out of Resources video

# 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.

# CHAPTER SUMMARY



- There are great differences across countries in living standards and growth rates.
- Productivity (output per unit of labor) is the main determinant of living standards in the long run.
- Productivity depends on physical and human capital per worker, natural resources per worker, and technological knowledge.
- Growth in these factors – especially technological progress – causes growth in living standards over the long run.



# CHAPTER SUMMARY



- Policies can affect the following, each of which has important effects on growth:
  - Saving and investment
  - International trade
  - Education, health & nutrition
  - Property rights and political stability
  - Research and development
  - Population growth
- Because of diminishing returns to capital, growth from investment eventually slows down, and poor countries may “catch up” to rich ones.