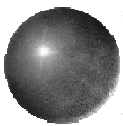


# *Productivity and Growth*

**Theory of Productivity and Growth**

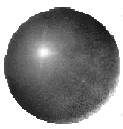
**Productivity and Growth in Practice**

**Other Issues of Productivity and Growth**



# *Standard of Living*

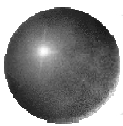
- **Economy's standard of living measure**
  - **Amount of goods and services available per person grows over the long run**
  
- **Generally increase:**
  - **increases in the amount and quality of resources**
  - **better technology**
  - **improvements in the laws**
    - **tax laws**
    - **property rights**
    - **patent laws**
    - **legal system**



# Growth and the PPF

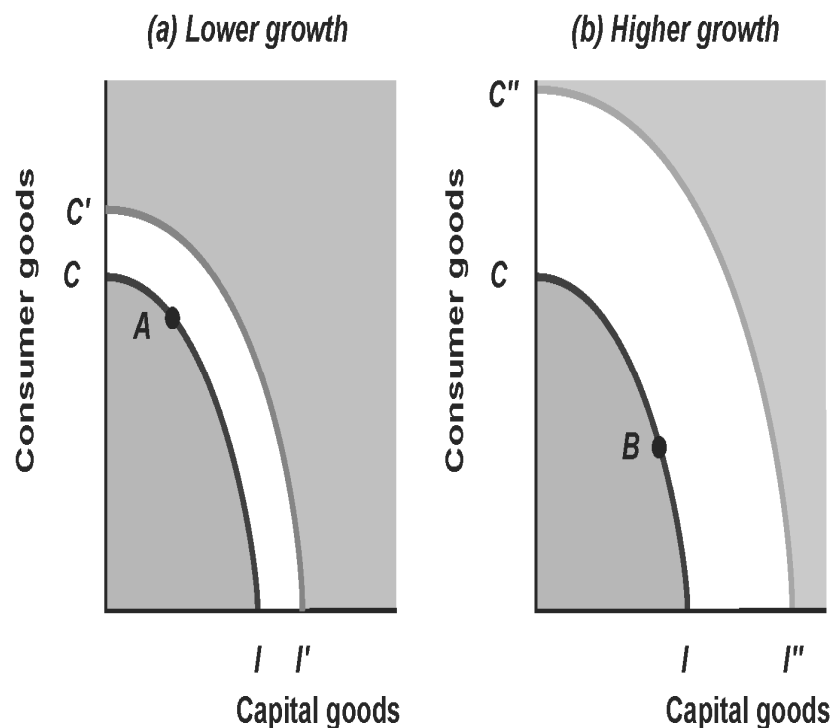
- **Production possibilities frontier (PPF)**
  - ▣ **Alternative combinations of goods that an economy can produce**
  - ▣ **Resources are used efficiently**
  - ▣ **Fixed:**
    - Quantity of resources
    - Level of technology
    - Rules of the game
- **Consider two categories of goods consumer goods and capital goods in next slide**

3

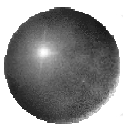


# Economic Growth

*CI* shows the possible combinations of consumer goods and capital goods produced in a given year

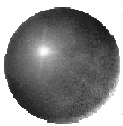


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# Why Economic Growth

- ⊕ **Resources increases**
- ⊕ **Labor supply growth**
  - Population increases
  - Existing population supplies more labor
- ⊕ **Growth in the capital stock**
  - More capital goods produced → more economy grow
- ⊕ **Improvement in Technology**
  - More efficient use of existing resources
- ⊕ **Improvements Rules of the game**



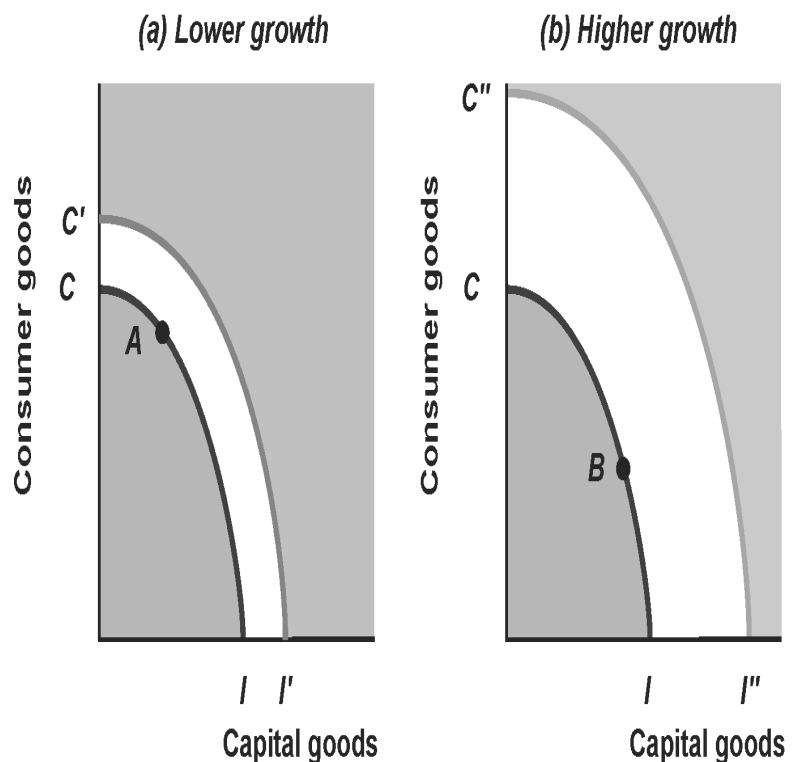
# Capital Produced and Growth

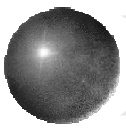
Capital produced this year affects the location of the PPF next year

Left panel:  
Chosen point A  
PPF shifts from CI to C'I'

Right panel:  
Choose B  
PPF will shift farther to C''I''

If an economy invests more in capital – gives up more consumer goods – will experience larger economic growth





# *What is Productivity?*

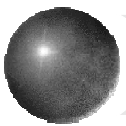
## ⊕ **Production:**

- ⊞ ***A process that transforms resources into products***

## ⊕ **Productivity**

- ⊞ **How efficiently resources are used?**
- ⊞ **Higher productivity,**
  - More goods can be produced from a given amount of resources
  - PPF more Farther out
- ⊞ **Definition:**
  - the ratio of total output to a specific measure of input

7



# *Labor Productivity*

- ⊕ **Total output divided by the hours of labor employed to produce that output**
- ⊕ **Most commonly used measure**
  - ⊞ **Accounts for a relatively large share of the cost of production – 70% on average**
  - ⊞ **More easily measured than other inputs**
  - ⊞ **Can be measured as**
    - hours per week
    - full-time workers per year

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# Labor Productivity

## Capital:

- ▣ Most responsible for increasing labor productivity
- ▣ Accumulates more capital per worker,
  - → labor productivity increases
  - → standard of living increases

## Two broad categories of capital

### ▣ *Human Capital*

- Accumulated knowledge, skill, and experience of the labor force

### ▣ *Physical Capital*

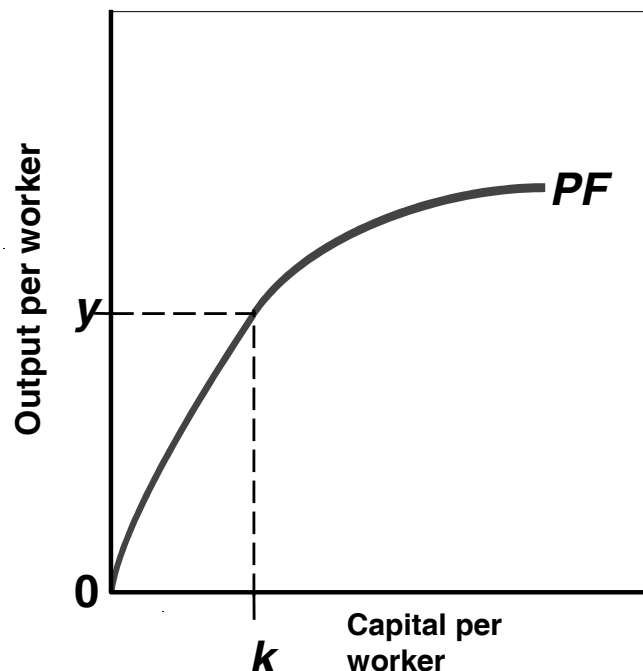
- Includes the machines, buildings, roads, airports, communication networks and other manufactured creations used to produce goods and services

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# Per-Worker Production Function

Relationship between capital per worker (horizontal axis) and output per worker (vertical axis), other things constant

$k$  units of capital per worker,  
→ average output per worker is  $y$



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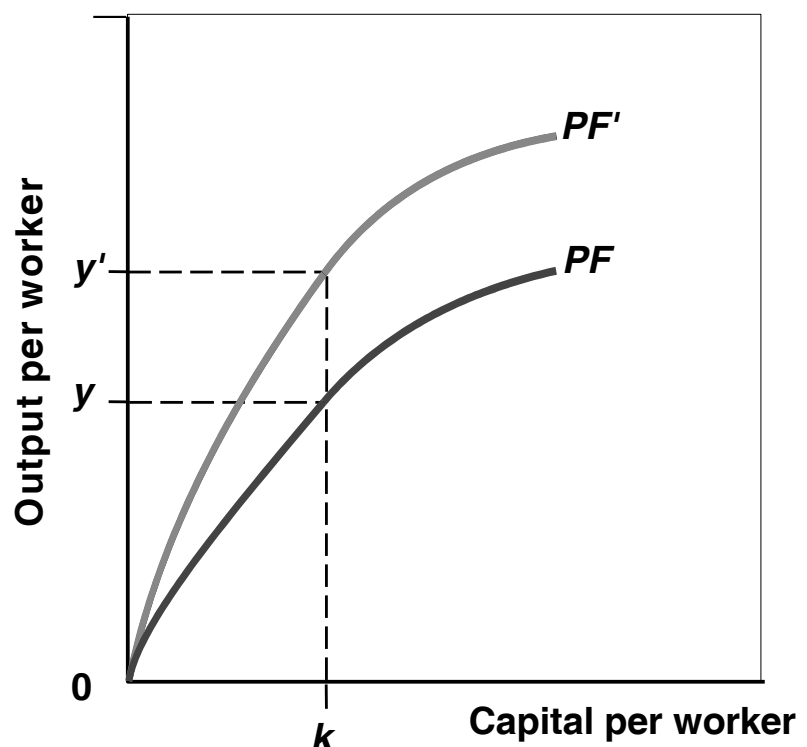
## Per Worker Production Function

- **The curve is increasing and concave:**
  - **Increase:**
    - Increase in capital per worker helps worker to produce more
  - **Concave:**
    - the law of diminishing marginal returns
    - *the more capital for per worker, the less additional output can be gained by increasing capital*
- **Capital deepening:**
  - Increase in the amount of capital per worker
  - One source of rising labor productivity  
→ economic growth

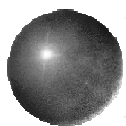
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## Impact of a Technological Breakthrough

Technological change improves the productivity  
→ Shift from PF to PF'  
→ more output is produced at each level of capital per worker



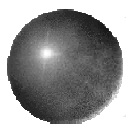
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## *Economic Growth*

- ⊕ **Two kinds of changes in capital improve worker productivity**
  - ⊕ **Increase in the quantity**
    - **Movement along the per-worker production function**
    - **Changes in the quantities account for only one-tenth of the economic growth**
  - ⊕ **Improvement in the quality**
    - **Rotates the per-worker production function upward**
    - **Nine-tenths of the increase in economic growth**

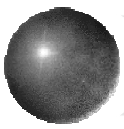
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## *Rules of the Game*

- ⊕ **Formal and informal institutions that promote economic activity**
  - ⊕ **Laws, customs, conventions,**
  - ⊕ **Stable political environment and system of well-defined property rights**
- ⊕ **Improvements in the rules of the game could result in more output for each level of capital**
- ⊕ **Upward shift in the per-worker production function**

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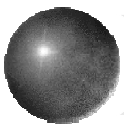


# *Productivity and Growth*

**Theory of Productivity and Growth**

**Productivity and Growth in Practice**

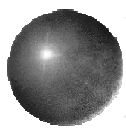
**Other Issues of Productivity and Growth**



## *Productivity / Growth in Practice*

- **Differences in the standard of living**
  - **Per capita output in the U.S. is fifty times more than the poorest countries**
  - **With only 5% population, the U.S. produces more than the nations comprising the bottom 50% population put together**
  
- **World's economies can be sorted into two broad groups**
  - **Industrial market countries or developed countries**
  - **Developing or third-world countries**

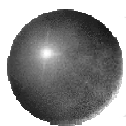




## *Industrial market countries (Developed countries )*

- **About 20% of the world's population**
- **Economically advanced capitalistic countries**
  - **Western Europe, North America, Australia, New Zealand, and Japan**
- **First to experience long-term economic growth**
- **Have the highest standard of living**

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## *Developing Countries*

- **80% of the world's population**
- **Lower standard of living**
- **Relatively less human and physical capital**
- **Majority of workers in these countries are employed in agriculture**

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# 世界貧窮問題的成因

## <基督教信仰與今日的世界經濟>

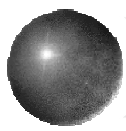
- ⊕ 外債及不適當的外援
  - 西方富裕國家及國際銀行借貸給第三世界貧窮國家的原意是助其脫貧，但高利率卻形成債務危機。自從外債問題開始以來，非洲人民的生活卻下降了20%。單是債務的每年利息已相等於整體生產總值的大部份。此外，外國提供的援助計劃不得其法，用於基本醫療保健、小學教育、農村供水、衛生設施的總額只佔援助的極小比例。貸款未能鼓勵貧困者自給自足，用於大型建設的貸款不能使窮人直接受惠。
- ⊕ 土地作為商品
  - 土地對生命非常重要，可以用來建屋、耕種及娛樂。但隨著資本主義經濟體系的興起，土地降格為普通的商品，被視為投機對象之一，不少地方因為市場力量不受限制而導致大部份的土地都集中在一小撮人手中。
- ⊕ 糾紛、戰爭及軍事化
  - 自從第二次世界大戰以來，全球已發生過一百多次戰爭，導致超過二千多萬人死亡，戰爭造成人命傷亡及帶來沉重的軍費負擔，對產業及生產設施造成直接損毀，亦對經濟生命有破壞性的影響。此外，軍事文化很容易產生賄賂和濫用權力的情況，威脅人權、剝奪平民參與政府的機會，以及破壞政府向人民負責的原則。
- ⊕ 不平等貿易
  - 第三世界的農產商品的價格不斷下降，工業國以貿易保護條款使發展中國家不能得到較佳的利潤。

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# *Education and Economic Development*

- ⊕ **Vital source of productivity:**
  - **Quality of labor**
- ⊕ **How education contribute the economic development?**
  - **Makes workers aware of the latest techniques**
  - **Makes workers more receptive to new ideas and methods**
- ⊕ **Countries with advanced educational systems were usually first to develop**

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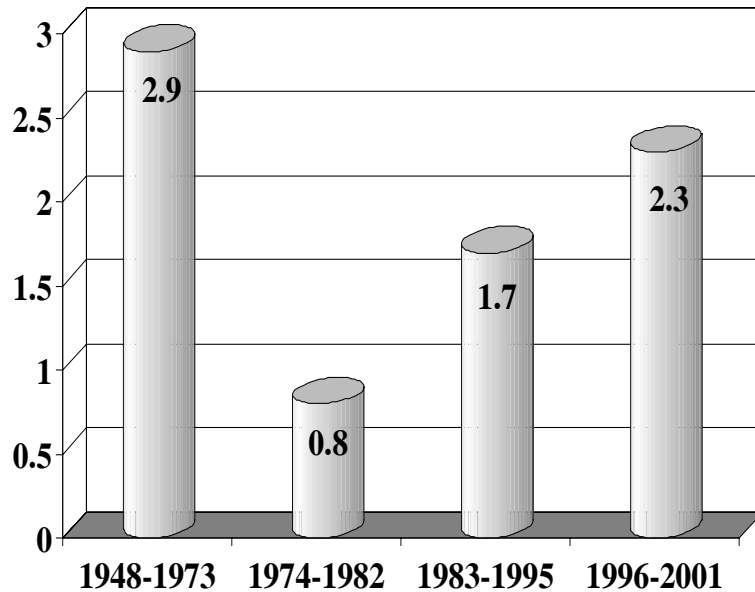


## *U.S. Labor Productivity Growth Slowed During 1974-1982, then Rebounded*

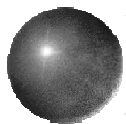
Causes of slowdown:

- (1) Oil crisis from 1973
- (2) Environmental and safety laws required more costly production methods

Rebound during the later years  
→ Information revolution powered by the computer chip



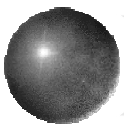
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## *Output Per Capita*

- **Total output can grow as a result of**
  - greater labor productivity,
  - more labor
- ⊕ **Labor productivity equals real GDP divided by the quantity of labor**
- ⊕ ***Output per capita***
  - ⊞ Real GDP divided by the population
  - ⊞ Best measure of economy's standard of living
  - ⊞ Indicates how much an economy produces on average per person

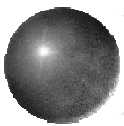
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## *Output Per Capita*

- **Relation between**
  - **output per capita**
  - **labor productivity**
  
- **Labor productivity: \$60,000/year**
  - **If there is one worker for every two people in the economy,**
  - **Output per capital  $\rightarrow \$60,000 / 2 = \$30,000$**
  
- **Output will increase if**
  - **labor productivity increases**
  - **the worker-population ratio increases**

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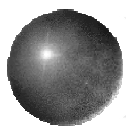


## *Productivity and Growth*

**Theory of Productivity and Growth**

**Productivity and Growth in Practice**

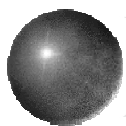
**Other Issues of Productivity and Growth**



## *Technological Change and Unemployment*

- **Technological change usually reduces the number of workers needed to produce a given output**
- **Some fear that new technology leads to higher unemployment**
- **If this were true, unemployment rates should be lower in the developing countries.**
- **In fact, technological change also employment by making products more affordable**

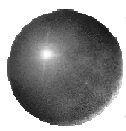
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## *Research and Development*

- **Improvements in technology arise from scientific discovery,**
- **Distinguish between**
  - ***Basic research***
    - **Search for knowledge without regard to how it will be used**
    - **First step toward technological advancement**
    - **Less immediate payoff yet yields a higher rate of return to society as a whole**
  - ***Applied research***
    - **Seeks to answer particular questions or to apply scientific knowledge to the development of specific products**

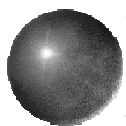
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## *Research and Development*

- ⊕ **Investment in R&D reflects the economy's efforts to improve productivity**
- ⊕ **One way to track R&D spending is to measure it relative to GDP**

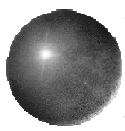
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## *Research and Development*

- ⊕ **Business R&D is more likely to be targeted toward applied research and innovations**
- ⊕ **R&D spending by governments and nonprofits may generate basic knowledge that has specific applications in the long run**
  - ⊕ **Ex: the Internet sprang from R&D spending on national defense**

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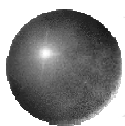


## *Convergence Theory*

**Will poor countries eventually catch up with rich ones?**

- ***Convergence theory* argues that developing countries can grow faster than advanced ones → eventually close the gap**
  - **To copy new technology is easier than to develop new one**

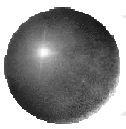
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## *Convergence Theory*

- **Evidence on convergence**
  - **Newly industrialized Asian economies of Hong Kong, Singapore, South Korea, and Taiwan (“Asian Tigers” )**
- **However, the nations that comprise the poorest third of the world’s population:**
  - **consumption per capita has grown significantly slower than the rest of the world**

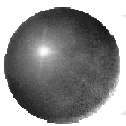
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## *Convergence Theory*

- ⊕ **Why the poorest countries have not gained**
  - ⊕ **Birth rates are nearly double those in richer ones**
    - Produce more consumer goods for a growing population
  - ⊕ **Differences in the quality of human capital**
    - Don't have enough background knowledge to learn portable technology.
  - ⊕ **Some countries lack the stable environment, established institutions, and infrastructures**

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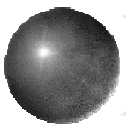


## *Industrial Policy*

- ⊕ **Two concerns of technologies of the future**
  - ⊕ **Huge money to develop firms may not easily raise or put at risk these large sums**
  - ⊕ **Technological breakthroughs spill over to other firms and industries;**
    - Firm may not to reap benefits from these spillover effects
    - Individual firms may under-invest in such research

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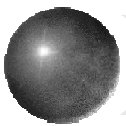
# *Industrial Policy*

- **To solve these two problems: government involvement through industrial policy**

- ***Industrial policy***

- **Use taxes, subsidies, regulations in the private sector to nurture the industries and technologies of the future**
- **Gives domestic industries advantage over foreign competition with the objective one of securing a leading global role for domestic industries**

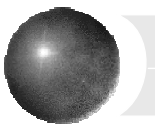
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## *課堂報告*

- 請解釋何謂Human capital,何謂physical capital
- 請解釋何謂capital deepening
- 請解釋何謂output per capita
- 請解釋output per capita 和labor productivity的關係
- 請解釋何謂 convergence theory

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## *Homework*

- 15. Demo the relationship between growth and the PPF