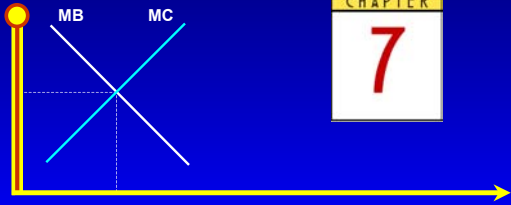
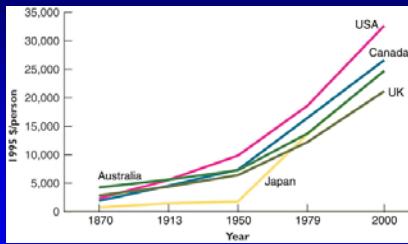


Economic Growth, Productivity, and Living Standards

CHAPTER 7



Real GDP per Person in Five Industrialized Countries, 1870 - 2000



The Remarkable Rise in Living Standards: The Record

- A Caveat
 - Historical estimates are less precise
 - Comparing economic output over a century cannot account for new goods and services

The Remarkable Rise in Living Standards: The Record

- Observation
 - The variety, quality, and quantity of goods and services increased enormously during the 19th and 20th centuries, as reflected in real per capita GDP.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 4

Real GDP per Person in Selected Countries, 1870-2000 (in 1995 U.S. Dollars)

Country	1870	1913	1950	1979	2000	Annual % change 1870-2000	Annual % change 1950-2000
Australia	5,626	7,385	9,561	18,033	24,708	1.1	1.9
Canada	2,447	5,791	9,362	20,899	26,604	1.8	2.1
France	2,249	4,401	6,049	17,801	22,447	1.8	2.6
Germany	1,205	2,320	5,005	18,014	23,247	2.3	3.1
Italy	2,248	3,167	4,042	13,331	21,930	1.8	3.4
Japan	963	1,825	2,216	16,899	24,772	2.5	4.8
United Kingdom	3,500	5,374	7,832	14,889	21,142	1.4	2.0
United States	2,843	6,745	11,921	22,480	32,629	1.9	2.0

Observations
 -1870: Australia had the highest per capital real GDP and Japan the lowest
 -2000 real per capita GDP in Japan exceeded Australia
 -Note the difference in the growth rate of 1.1% for Australia and 2.5% for Japan

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 5

- For the U.S. How to get the 1.9% number over 130 years?
- $2,843 * (1+\text{growth_rate})^{130}=32,629$
- $(1+\text{growth_rate})^{130}=32,629/2,843=11.47$
- $(1+\text{growth_rate})^{130}=11.47$
- $(1+\text{growth_rate})=11.47^{1/130}=11.47^{0.00769}$
- $\text{growth_rate} = 1.9$

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 6

Why "Small" Differences in Growth Rates Matter

- Compound Interest
 - Suppose:
 - ◆ In 1800 \$10 deposited @ 4% interest
 - ◆ In 2000 the account is worth \$25,507.50
 - ◆ $\$10 \times (1.04)^{200} = \$25,507.50$

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 7

Why "Small" Differences in Growth Rates Matter

- Compound Interest
 - The payment of interest not only on the original deposit but on all previously accumulated interest

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 8

Why "Small" Differences in Growth Rates Matter

Interest rate (%)	Value of \$10 after 200 years
2	\$524.85
4	\$25,507.50
6	\$1,151,259.04

Observations

- A small sum compounded over long periods can greatly increase in value
- Small differences in interest have a very large impact on value

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 9

Why “Small” Differences in Growth Rates Matter

- Compound Interest
 - Economic growth rates are similar to compound interest rates.
 - Government policies that affect the long-term growth rate by a small amount will have a major economic impact.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 10

Why Nations Become Rich: The Crucial Role of Average Labor Productivity

- Question
 - What determines a nation’s economic growth rate?
 - Some definitions:
 - ◆ Y = real GDP
 - ◆ N = number of employed workers
 - ◆ POP = total population

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 11

Why Nations Become Rich: The Crucial Role of Average Labor Productivity

- Real GDP Per Person

$$\frac{Y}{POP} = \frac{Y}{N} \times \frac{N}{POP}$$

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 12

Why Nations Become Rich: The Crucial Role of Average Labor Productivity

- Question
 - What determines a nation's economic growth rate?
 - ◆ In the long run, increases in output per person arise primarily from increases in average labor productivity.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 16

The Determinants of Average Labor Productivity

- Human Capital
 - The talents, education, training, and skills of workers

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 17

The Determinants of Average Labor Productivity

- Physical Capital
 - Worker productivity depends not only on their skills (human capital) but on the tools (physical capital) they have to work with.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 18

Capital, Output, and Productivity in the Candy-Wrapping Factory

(1) Number of machines (capital)	(2) Total number of candies wrapped each week (output)	(3) Total hours worked per week	(4) Candies wrapped per hour worked (productivity)
0	16,000	80	200
1	32,000	80	400
2	40,000	80	500
3	40,000	80	500

Observations

- For a given number of workers, adding capital will generally increase output and average labor productivity
- The more capital that is already in place, the smaller the benefits of adding extra capital

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 19

The Determinants of Average Labor Productivity

- Diminishing Returns to Capital
 - If the amount of labor and other inputs employed is held constant, then the greater the amount of capital already in use, the less an additional unit of capital adds to production.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 20

The Determinants of Average Labor Productivity

- Physical Capital
 - Public policy designed to stimulate growth should consider that:
 - ◆ Increasing the amount of capital available to the workforce will tend to increase output and average labor productivity.
 - ◆ The degree to which productivity can be increased by an expanding stock of capital is limited.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 21



Average Labor Productivity and Capital per Worker in 15 Countries, 1990






The Determinants of Average Labor Productivity

- Land and Other Natural Resources
 - Generally, an abundance of natural resources increases the productivity of workers.
 - Resources can be obtained through international markets.




The Determinants of Average Labor Productivity

- Technology
 - New technologies are the single most important source of productivity improvement.
 - A new technology will expand the productivity in many sectors by stimulating greater specialization.

 **The Determinants of Average Labor Productivity**

- Entrepreneurship and Management
 - Factors influencing entrepreneurship
 - ◆ Taxation
 - ◆ Regulation
 - ◆ Social Customs

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 25

 **The Determinants of Average Labor Productivity**

- Entrepreneurship and Management
 - Management:
 - ◆ Influence productivity by implementing more efficient methods of production.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 26

 **The Determinants of Average Labor Productivity**

- The Role of Government in Fostering Productivity
 - Establish:
 - ◆ *Well-defined property rights*
 - ◆ *Maintain political stability*
 - ◆ *Promote free and open exchange of ideas*

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 27

The Worldwide Productivity Slowdown -- and Recovery

- Why the decline in worldwide productivity?
 - Decrease in the quality of public education
 - Higher oil prices
 - Poor measurement of productivity
 - Technological depletion hypothesis

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 31

The Costs of Economic Growth

- Costs of Economic Growth
 - The opportunity cost of increasing the production of capital goods is less consumer goods.
 - Reduced leisure time, worker's safety, and health
 - The cost of R & D
 - The cost of education (human capital)

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 32

The Costs of Economic Growth

- What Do You Think?
 - Do the benefits of economic growth exceed the costs?

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 33



Promoting Economic Growth

- Promoting Growth
 - Policies that promote saving and investment
 - Policies that support research and development
 - The legal and political framework

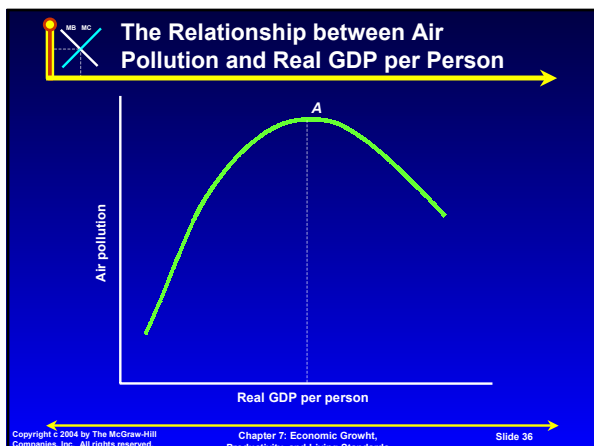
Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 34



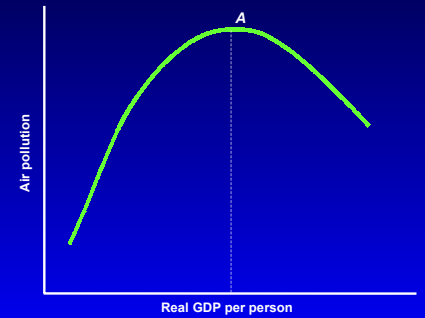
Promoting Economic Growth

- The Poorest Countries: A Special Case?
 - Improve the legal and political framework
 - ◆ Corrupt legal systems create uncertainty about property rights
 - ◆ Taxation and regulation discourages entrepreneurship
 - ◆ Markets are not allowed to function
 - ◆ Lack of political stability discourages foreign investment

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 35



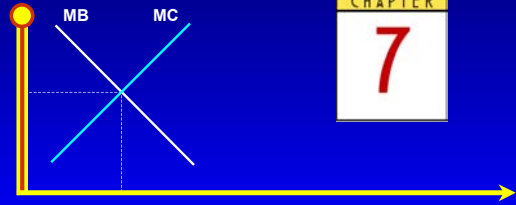
The Relationship between Air Pollution and Real GDP per Person



The graph plots Air pollution on the vertical axis and Real GDP per person on the horizontal axis. A green inverted U-shaped curve starts at a low level of pollution and low GDP, rises to a peak labeled 'A', and then declines as GDP continues to rise. A vertical dashed line extends from the peak 'A' down to the horizontal axis.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Chapter 7: Economic Growth, Productivity, and Living Standards Slide 36

End of
Chapter



CHAPTER
7
