ECO 202 Principles of Economics II

Lecture 6: Long-Run Economic Growth: Sources and Policies

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Obtaining Economic Growth

- In the previous chapter, we looked at ways to measure economic growth in the long and short terms.
- In this chapter, we will consider the effects of different government policies on long-term economic growth.
- Economic growth, after all, is not inevitable; history has seen long periods of stagnation where no sustained increases in output per capita occurred.
- Why have some countries been able to achieve rapidly increasing real GDP per capita, while other countries have failed to keep pace?

Our goal in this chapter is to develop a **model of economic growth** to help answer questions such as this.

Overview

Economic Growth over Time and across the World

Some Numbers

- Economist Bradford DeLong estimates that in 1,000,000 B.C., our ancestors had a GDP per capita of approximately $145 (in 2015 dollars).
- He estimates that GDP per capita in 1300 A.D. was also about $145.
- In other words, no sustained economic growth occurred before the Middle Ages; a peasant on a farm in 1300 A.D. was about as well off his ancestors.

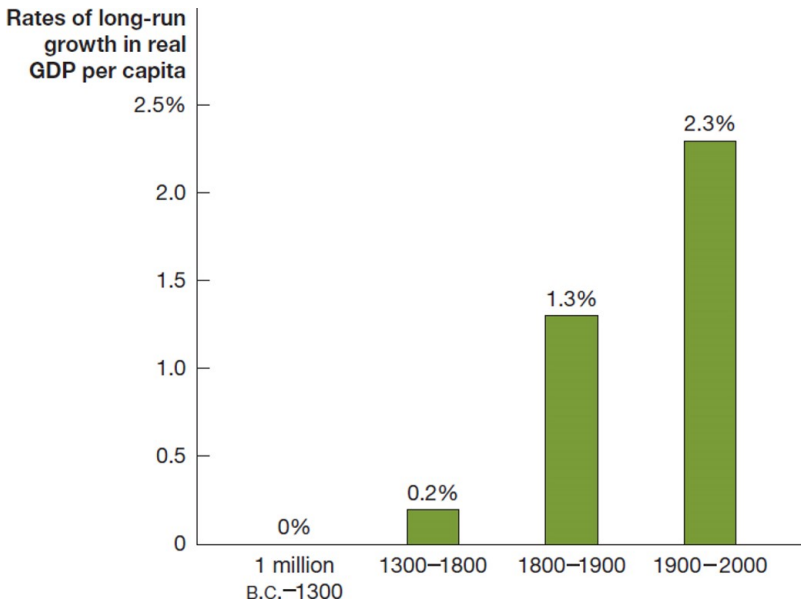
The Industrial Revolution

- Significant economic growth did not really begin until the Industrial Revolution, the application of mechanical power to the production of goods and services which began in England around 1750.
- Before this, production of most goods had relied on human or animal power.
- The use of mechanical power allowed England and other countries-like the United States, France, and Germany-to begin to experience **long-run economic growth**.

Why Did the Industrial Revolution Begin in England?

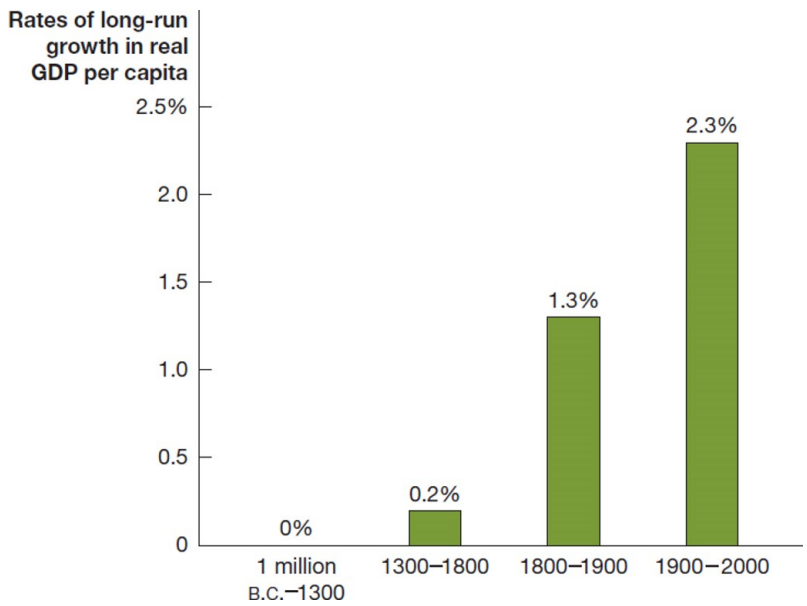
- Nobel Laureate Douglass North argues that the Glorious Revolution of 1688 was a key turning point in the economic history of Britain.
- The government was then able to make credible promises regarding upholding property rights, protecting wealth, and the elimination of arbitrary tax increases.
- This, claims North, made entrepreneurs willing to make the investments necessary for the Industrial Revolution to take hold.

Average Annual Growth Rates for the World Economy



- The graph shows Bradford DeLong's estimated average annual growth rates for the world economy.
- The Industrial Revolution and its subsequent spread throughout the world resulted in sustained increases in real GDP per capita.

Average Annual Growth Rates for the World Economy



- 1.3%⇒2.3% a big difference??
- Over 50 years, a 1.3 percent growth rate leads to about a 91 percent increase in real GDP per capita.
- But a 2.3 percent growth rate leads to about a 212 percent increase.
- In the long run, small difference in economic growth rates **MATTERS**.

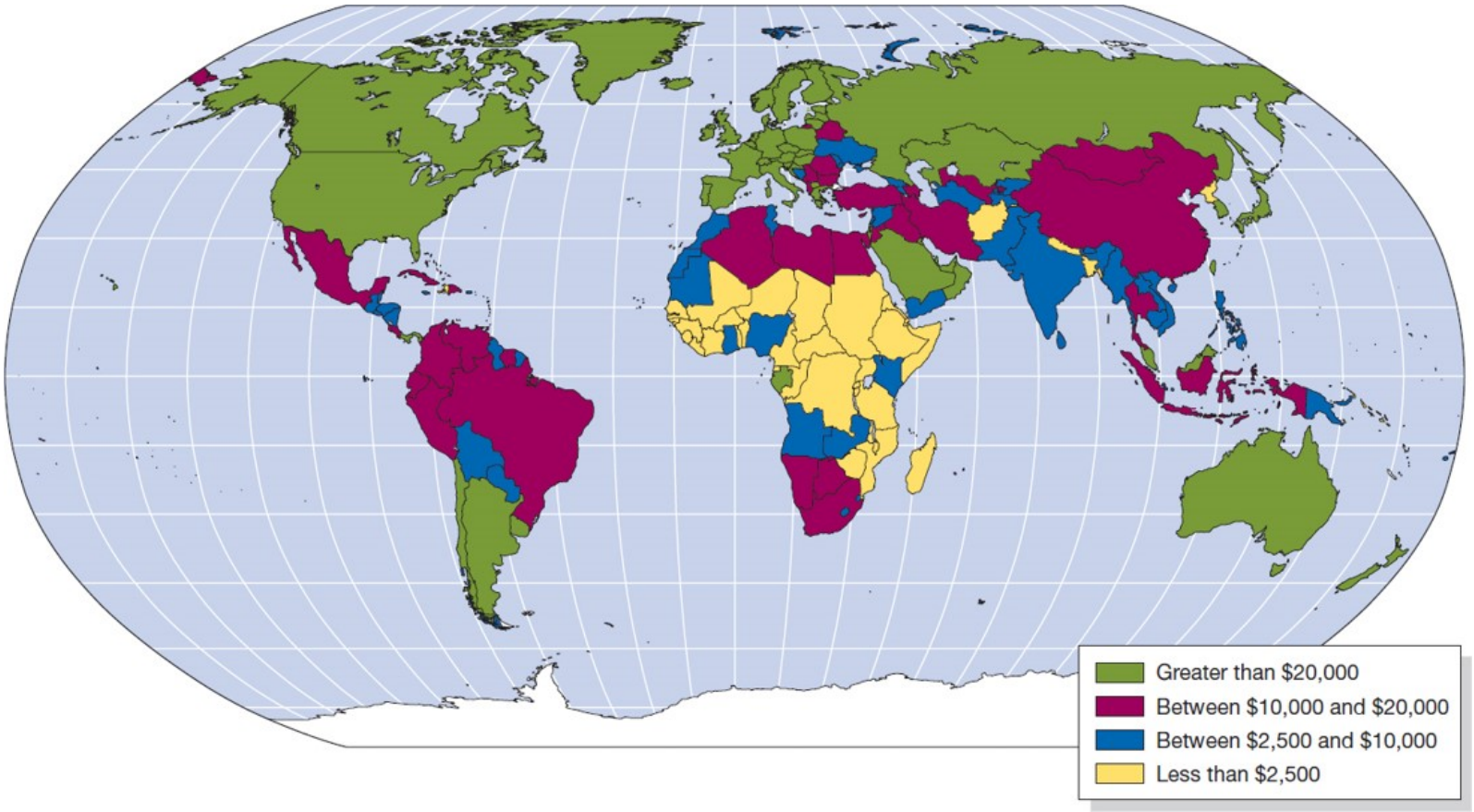
Why Do Growth Rates Matter?

- It doesn't mean iPhones and float-screen TVs
- In high-income countries, approximately 4 out of 1,000 babies die by a year of age.
- In the poorest countries, the rate is more than 100 out of 1,000.
- Poor growth has resulted in previously rich countries like Argentina lagging behind, with higher **rates of poverty**, lower **life expectancy**, and higher **infant mortality** than their prior peers.

Differences in Incomes across Countries

- **High income countries:** Western Europe, Australia, Canada, Japan, New Zealand, and the United States.
- The 1980s and 1990s have seen some economies progress out of the developing category, like Singapore and South Korea; these are often referred to as newly industrializing countries.
- Real GDP per capita is markedly different across the world, even after correcting for cost of living differences. In 2014 it ranged from a high of $144,400 in Qatar to a low of $600 in the Central African Republic.

Differences in Incomes across Countries



The figure shows GDP per capita (in $US) in 2014 for each of the worlds nations, adjusted for differences in the cost of living. `https://youtu.be/jbkSRLYSojo`

Is Income All That Matters?

- Are we missing something when we only focus on income?
- Education, health, civil rights, and political liberties all matters.
- Who leads to whom? Needs your wisdom.

What Determines Growth

What Determines Growth Rate?

Recall what we studied in the previous chapter that labor productivity determines long-run growth and capital (human capital), technology, and institutions affect labor productivity.

In this lecture, we will go deeper to build an economic growth model that explain growth rates in real GDP per capita over the long run.

For now, we only focus on

- The quantity of capital per hour worked and
- The level of technology.

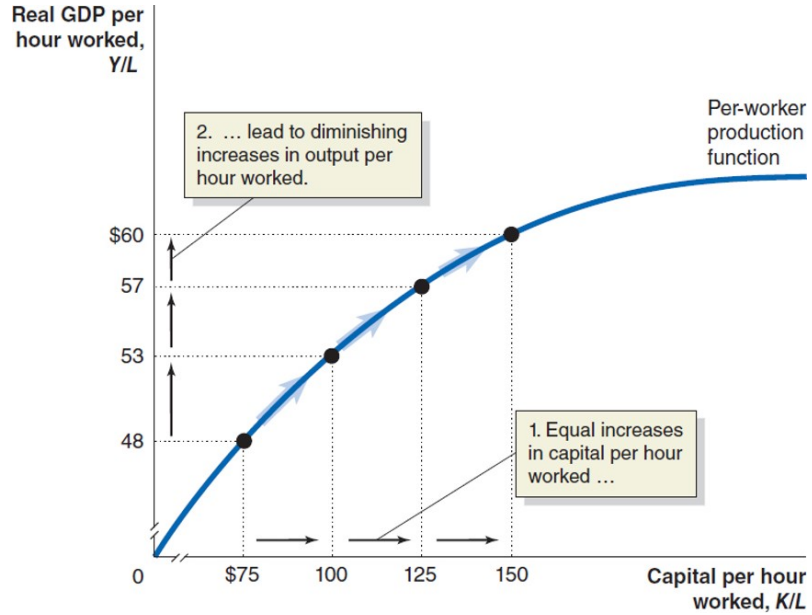
So our model will concentrate on changes in the quantity of capital and technological change: change in the quantity of output a firm can produce using a given quantity of inputs.

Three Main Sources of Technological Change

- Better machinery and equipment
- Increases in human capital
- Better means of organizing and managing production

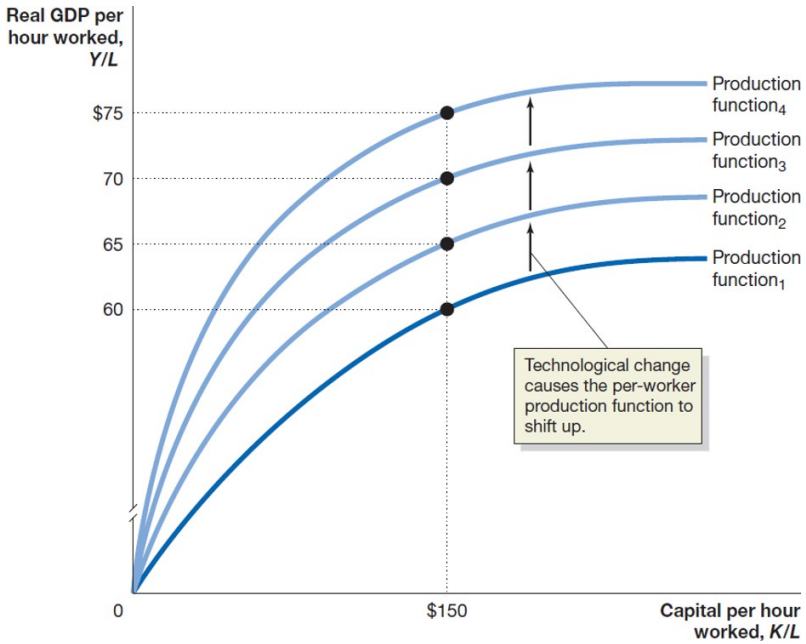
The Per-Worker Production Function

Suppose we wanted to describe a **per-worker production function**: the relationship between real GDP per hour worked and capital per hour worked, holding the level of technology constant.



- The first units of capital would be the most effective, allowing output per hour to increase most.
- Subsequent increases would result in diminishing returns: smaller incremental increases in output.

The Per-Worker Production Function



- Increases in capital will be very effective at increasing real GDP per capita for developing countries with less capital.
- In countries where the amount of capital is already relatively high, technological change becomes a more effective way to increase output per hour.

Example: Explaining the Economic Failure of the Soviet Union

- Centrally planned economy-government made all production and pricing decisions.
- Industry product and agricultural product wrongly priced.
- No incentive to improve technology.
- Slowing growth.

New Growth Theory

- The model of economic growth we have developed was essentially developed by Nobel Laureate Robert Solow in the 1950s.
- Solow did not seek to explain technological change, instead treating it as the result of chance scientific discoveries.
- Paul Romer developed the new growth theory, a model of long-run economic growth that emphasizes that technological change is influenced by economic incentives and so is determined by the working of the market system.

New Growth Theory and Knowledge Capital

- Romer argues that the accumulation of knowledge capital is a key determinant of economic growth.
- Increases in knowledge capital result from research and development and other technological advances.
- Physical capital is rival and excludable (private good).
- But knowledge capital is non-rival and nonexcludable (public good), and hence results in increasing returns (not at the firm level but the economy level).

Government's Role in Knowledge Capital Generation

Public goods such as knowledge capital generation result in free riding: benefitting from goods and services you do not pay for.

The public good nature of knowledge capital leads to a role for government policy in:

- Protecting intellectual property with patents and copyrights
- Subsidizing research and development
- Subsidizing education

Protecting Intellectual Property

Governments seek to protect intellectual property through the use of patents and copyrights, allowing firms to benefit from their own research and development increases their incentive to perform it.

- **Patents** are the exclusive right to produce a product for a period of 20 years from the date the patent is applied for. This period of time is designed to balance the chance for a firm to benefit from its invention against the need of society to benefit from it.
- **Copyrights** act similarly for creative works like books and films, granting the exclusive right to use the creation during and 70 years after the creators lifetime.

Subsidizing R & D and Education

- Subsidizing research and development
  - Governments might perform research directly (NASA) or subsidize researchers at institutions like universities.
  - Or provide tax incentives to firms performing R and D.
- Subsidizing education
  - In order to perform research and development, workers need to be technically trained. If firms provide this training, they recoup the cost by paying workers lower wages, decreasing the incentive for workers to take such jobs.
  - A solution to this is to have the government subsidize education, as it does in all high-income countries.

Joseph Schumpeter and Creative Destruction

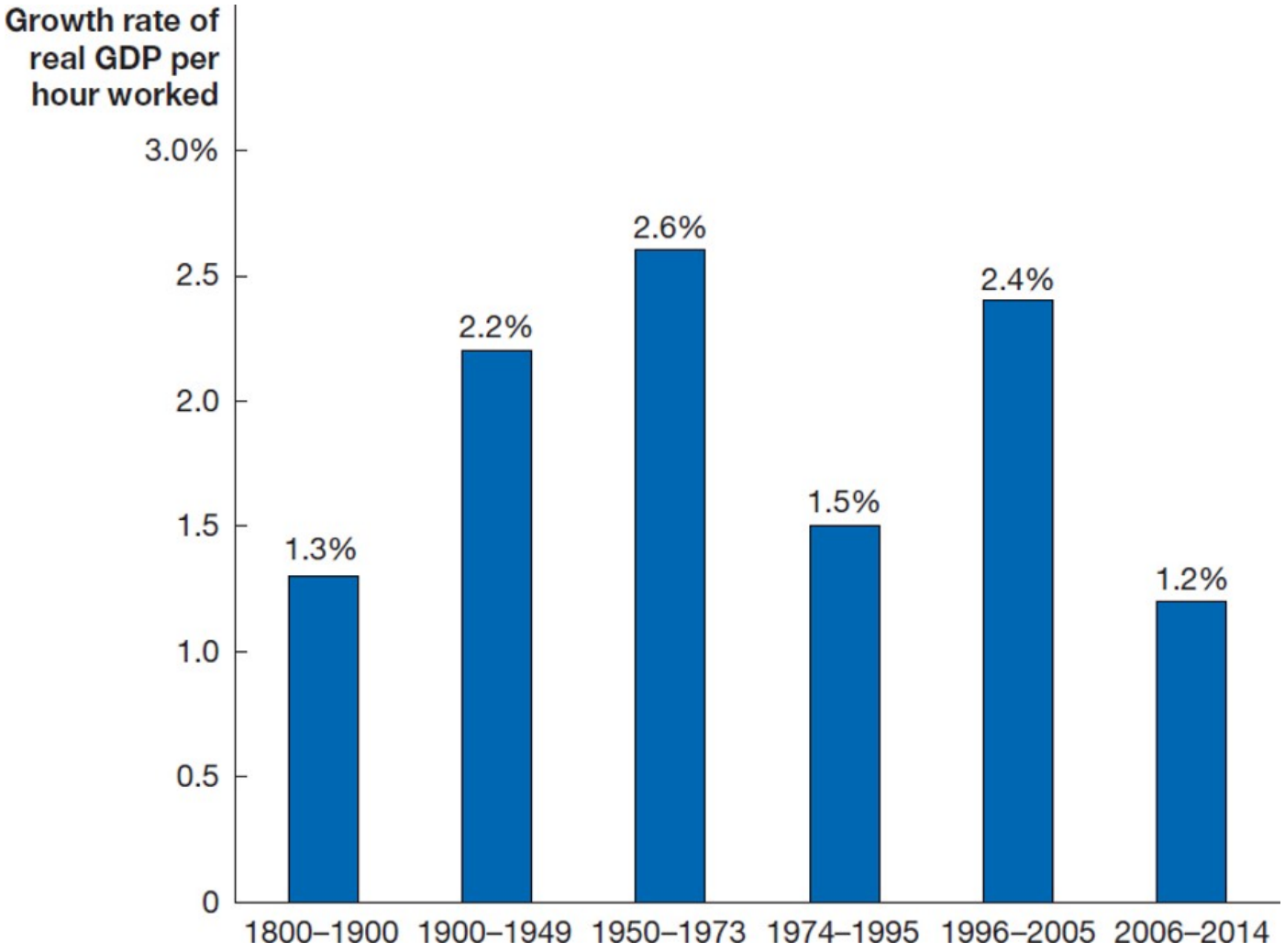
Joseph Schumpeter was born in Austria in 1883 and grew up there before moving to the United States.

- Schumpeter developed a model of growth emphasizing his view that new products unleashed a “gale of creative destruction.”
- Example: The automobile replaced the horse-drawn carriage by better serving the needs of consumers. This “creation” “destroyed” carriage makers and associated firms.

To Schumpeter, the entrepreneur is central to economic growth, and the profits of entrepreneurs provide the incentive for bringing together the factors of production-labor, capital, and natural resources-in new ways.

Economic Growth in the United States

Average Annual Growth Rates in Real GDP per Hour Worked in the United States



What Caused the Growth Slowdown of 1974-1995?

- Some economists argue that there was not really a slowdown in economic growth.
- From the 1970s, most growth in output came in the form of **services** rather than **goods**. Quality improvements are harder to measure.
- An alternative argument is that America concentrated more on quality of life issues, like health and safety, environmental regulations, and a change in educational focus.(Think about the disadvantage of GDP measure in the first lecture).

Where Is the U.S. Headed?

- Optimistic (Productivity is still growing)
- Pessimistic (Larry Summers, “Secular Stagnation”)
  - Slowing population growth will reduce the demand for housing
  - Modern I.T. firms require less capital than older firms
  - This price of capital has fallen relative to other goods
- Return to Faster Growth
  - 2007-2009 recession needs time to fully recover
  - Once the economy continues to recover, demand for investment goods will increase.
  - The rest of the world will also create demand for U.S. products.
  - Education, health service, etc.

Summary on Wednesday

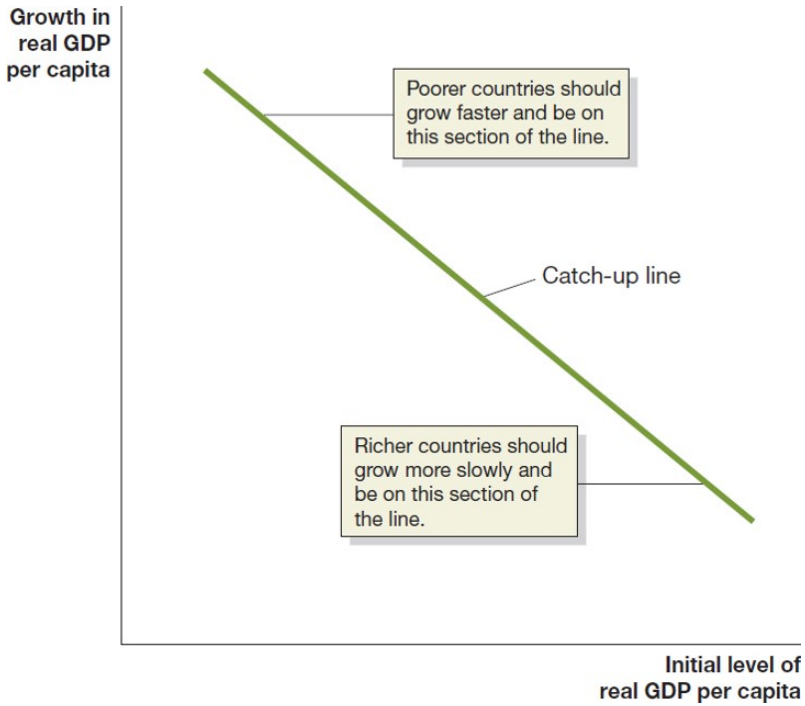
- A growth model with the quantity of capital per hour worked and the level of technology with diminishing return of capital.
- Technological improvement is more efficient for rich countries and capital may be more effective for poor countries.
- Knowledge capital is public good⇒spill-over effect⇒increasing return at the economy level
- What government should do? (Patents, R&D, and Education).
- “Creative destruction” by Joseph Schumpeter.
- Two views of the future of U.S. growth.
  - Pessimistic: less demand for housing, less capital needed, low price of capital.
  - Optimistic: Recession is temporary, demand for investment good will return, ROW needs U.S. products, education & health.

Why Isn't the Whole World Rich

Why Isn't the Whole World Rich?

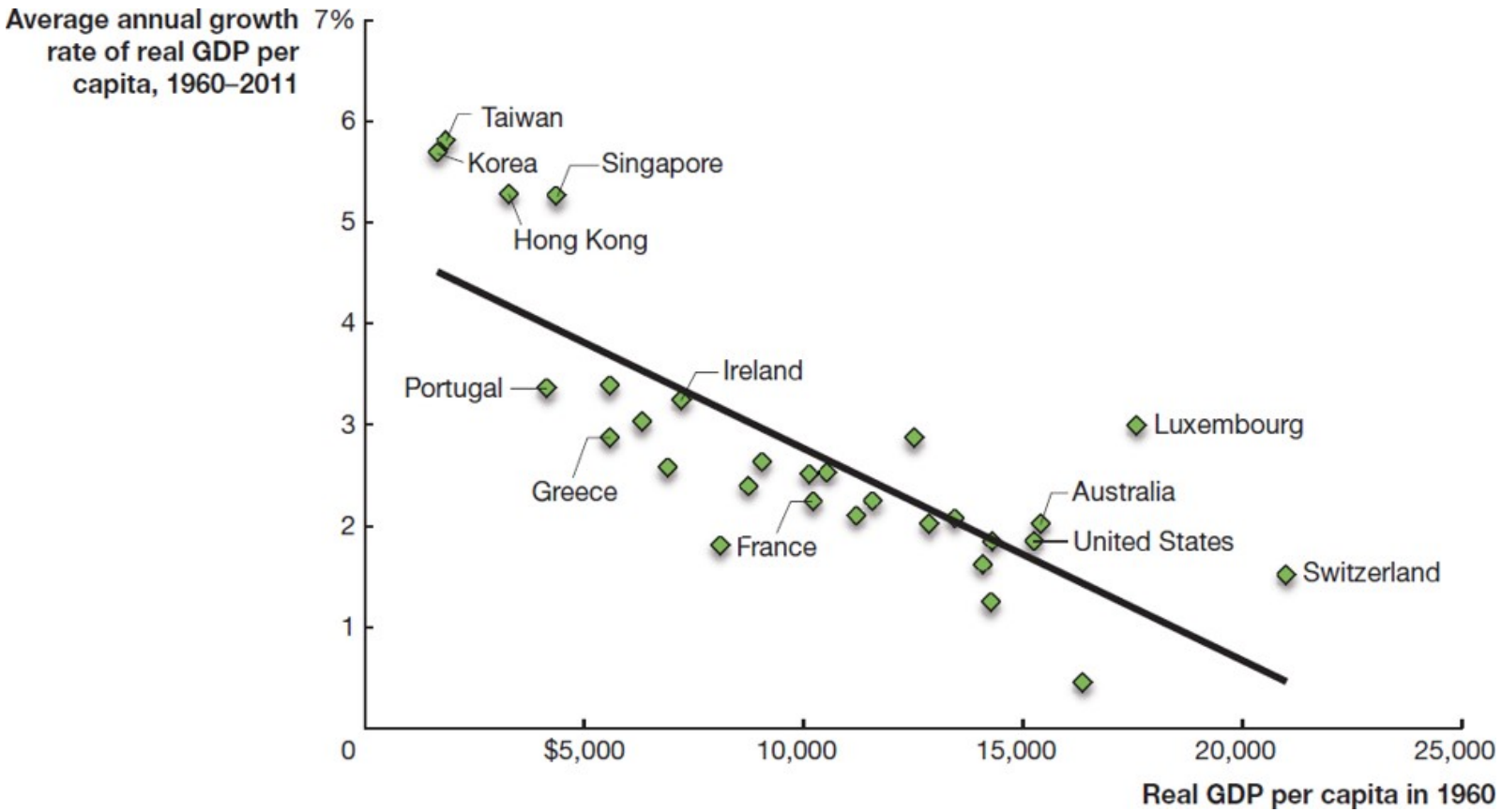
- The economic growth model predicts that poor countries will grow faster than rich countries. (Why?)
  - The effect of additional capital is greater for countries with smaller capital stocks
  - There are greater advances in technology immediately available to poorer countries

The Catch-Up Predicted by Model

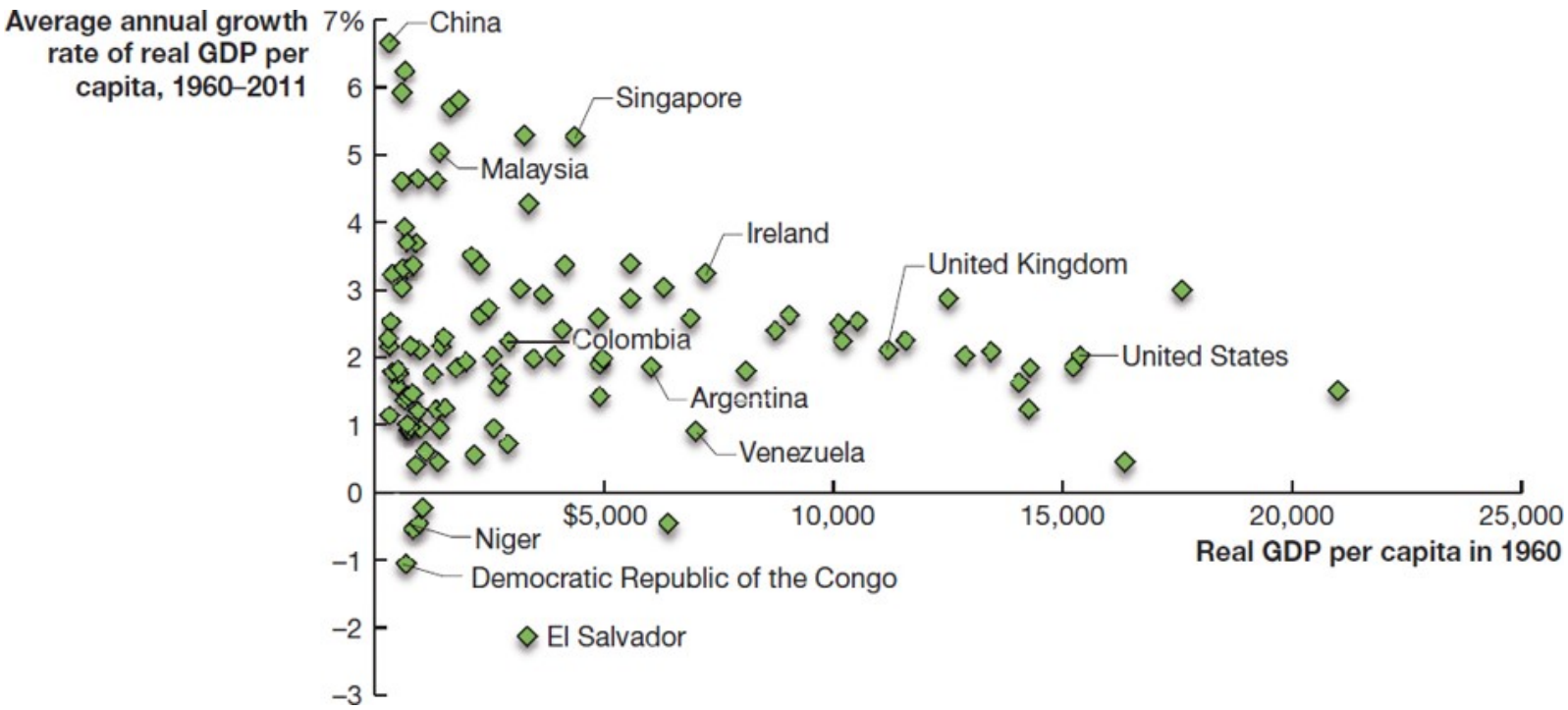


- If poorer countries grow faster than richer ones, they will start to catch up to, or converge to, the richer countries.
- Catch-up: the prediction that the level of GDP per capita (or income per capita) in poor countries will grow faster than in rich countries.

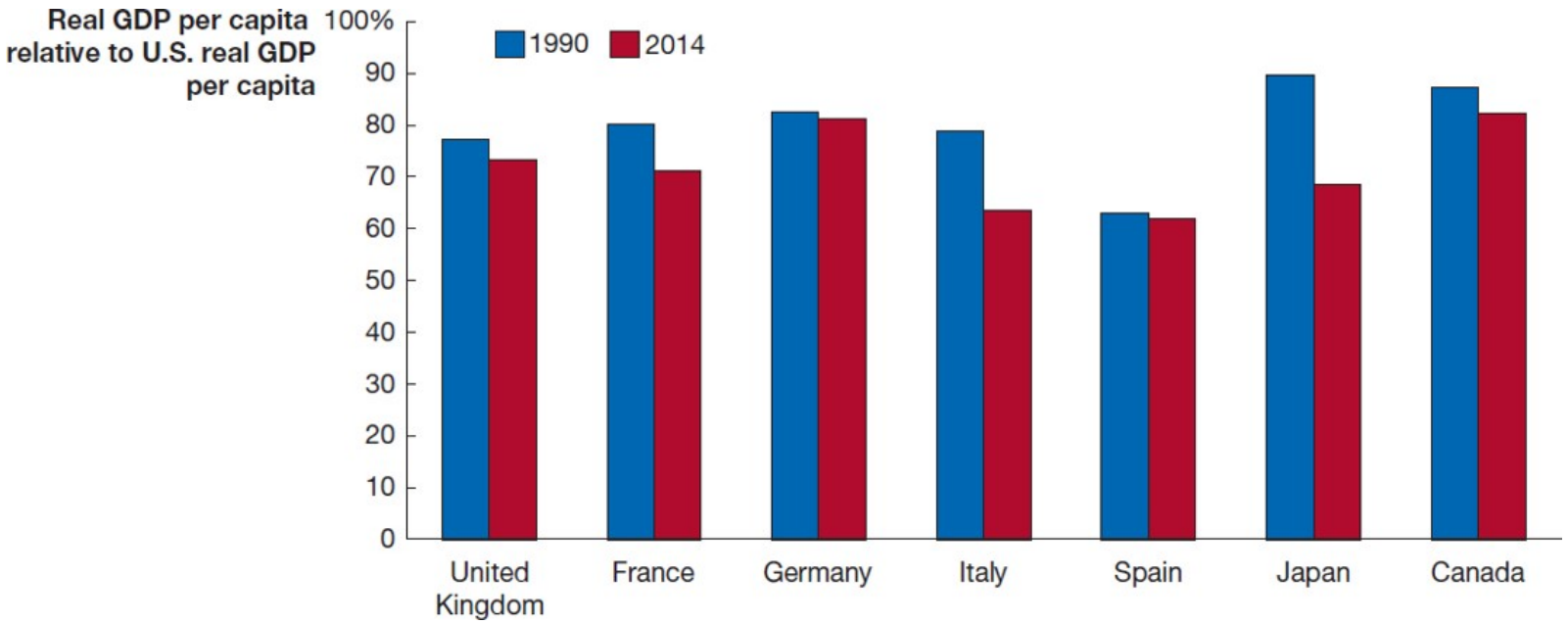
Catch-Up Among High-Income Countries



Catch-Up in the World? Mostly Not



Other High-Income Countries Catching-Up the U.S.?



Why?

- U.S. **labor markets** are relatively flexible; hiring and firing workers is relatively unrestricted by government regulation.
  - Similarly, American workers tend to enter the work force sooner and retire later than do workers in Europe.

- The U.S. **financial system** is relatively efficient, and the high volume of trading ensures high liquidity, making the U.S. an attractive place to invest.
  - Small firms find obtaining capital relatively easy in the U.S. due to the advent of venture capital firms.

The Lack of Growth in Many Low-Income Countries

- Failure to enforce the rule of law
- Wars and revolutions
- Poor public education and health
- Low rates of saving and investment

Failure to Enforce the Rule of Law

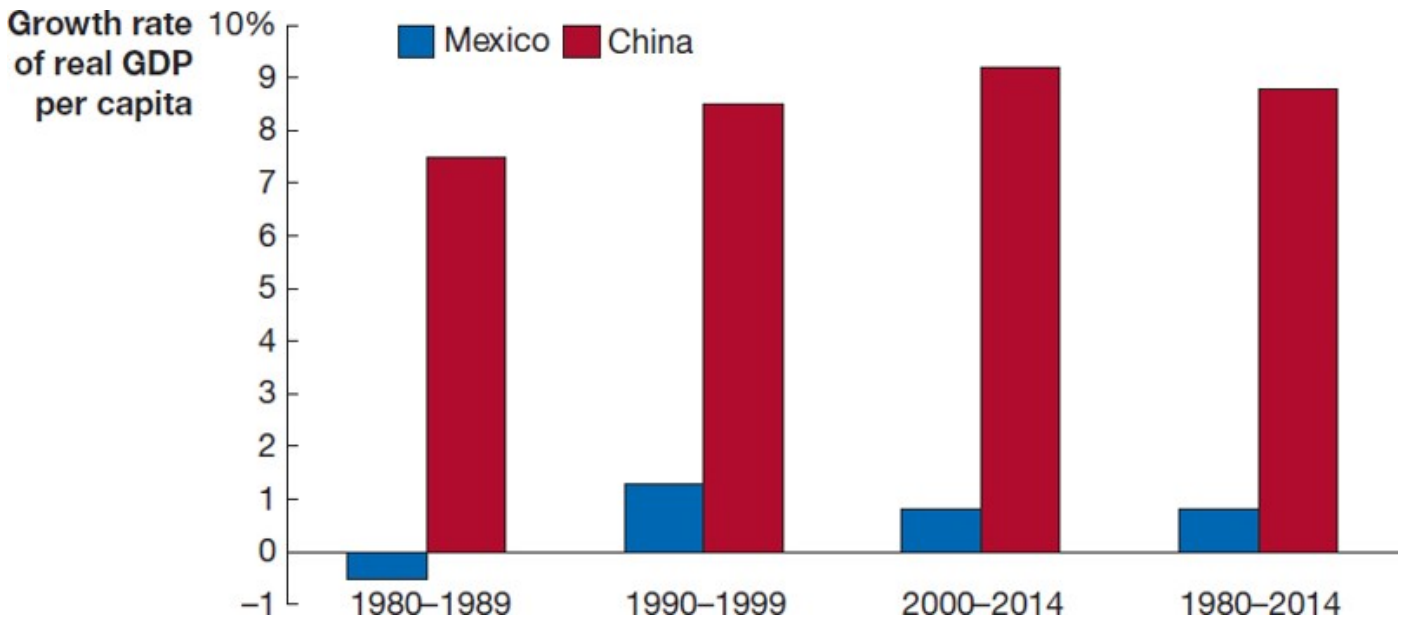
Linking it back to what we discussed in the previous chapter, the determinant of growth? (Property rights, institutions...)

The rule of law refers to the ability of a government to enforce the laws of the country, particularly with respect to protecting private property and enforcing contracts.

The key thing is **property rights**(institutions). Without this, entrepreneurs will not risk starting a business. An independent court system is important to enforce contracts.

Daron Acemoglu and James A. Robinson, "*Why Nations Fail: The Origins of Power, Prosperity, and Poverty*" `https://youtu.be/jsZDlBU36n0`

Why Hasn't Mexico Grown as Fast as China?



- Turning away from central planning toward a market system unleashed economic growth in China.
- Mexico still suffers from a corrupt government, weak rule of law, and a weak court system that discourages financial contracting.
- While Mexico's GDP per capita remains ahead of China's, it seems like it will not be long before China overtakes it.

Solution I: Foreign Investment

- Foreign direct investment: The purchase or building by a corporation of a facility in a foreign country.
- Foreign portfolio investment: The purchase by an individual or a firm of stocks or bonds issued in another country.

Foreign investment can take the place of insufficient domestic investment, whether from private or government sources.

Solution II: Trade (Globalization)

- Comparative advantage.
- More open to the global market produces higher rates of growth.

Will China's Standard of Living Exceed the U.S.?

If Chinese and American growth rates continue, China's standard of living would exceed that of the U.S. in 2036. But will it really happen?

- Much of Chinese growth is due to capital investment, which will have diminishing returns.
- Some of Chinese growth is due to transition to a market economy.
- Aging Chinese population due to population control policies.
- China remains largely autocratic, with lingering concerns about security of property rights and independent rule of law.

`https://youtu.be/WI0W910_yIA?t=4m11s`

Growth Policies

Growth Policies

1. Enhancing property rights and the rule of law
2. Improving health and education (Why? Increasing returns and spill-over effects).
3. Policies that promote technological change
4. Policies that promote savings and investment

Is growth a good thing? Yes but take care of environment and protect natural resources and culture.

Summary

- Catch-up is predicted by our growth model.
- We saw evidence for high-income countries but not world-wide.
- Among high-income countries, U.S. is not caught up by others. (Labor market and financial market.)
- Why poor countries are poor? (Law enforcement, wars, public health & education, low saving & investment).
- Solution? (Poor: foreign investment and global trade)
- Growth policies.