

Econ 270A

**Theory and Empirics of Economic
Growth**

UCD, Fall 2009

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General Information, Econ 270A

- **Units: 4**
- **Mode of Grading: Letter**
- **Prerequisites for enrollment: ECON 200 D, E.**
- **Auditing: Welcome**
- **Class meets: Tuesday and Thursday 12-1.30**
- **OH: Tuesday and Thursday 1.30-2.30 PM. Or by appointment**
- **Class Room: Wellman 229**

Description

- The course aims at providing students with understanding of the most popular modeling techniques and methods of empirical analysis used in the modern economics of Growth.
- The course has a first half, mostly focused on basic models and basic Empirical Approaches and a second half mostly focused on interesting topics of recent research in economic growth.

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Books

- My lectures for the first part of the course will be based on the book “**Economic Growth**” by Barro and Sala i Martin: originally published in 1995 by McGraw- Hill Cambridge Ma, now reprinted by MIT Press 2nd edition 2004 (**BS**).
- The second half of the course will be based on topical chapters of the book “**Modern Economic Growth**” by Daron Acemoglu, Princeton University Press, 2009. You may want to purchase one or both books if you are interested in doing research in this area. If not you can arrange copying of some relevant parts with me or with the library.

Important Stuff

- Reading all the chapters referenced in the syllabus is required for people who take this course.
- During the first half of the course I will present the material from the book, the style of lecture will be more usual. In the second part of the course you will present the topic, I will guide the discussion and clarify some concepts, the style will be more seminar-like.
- All students should read the chapters before the class because a discussion will follow the presentation.

Grade

- **The Grades will be based on the following assignments.**
- **The presentation of one of the topics during the second half of the class, using a power-point presentation (50%)**
- **A 5 pages research/literature review on the same topic to be turned in at the end of the course. It can be used as basis for the 2nd year literature review.**

Part 1

- **Introduction: The facts and Challenges of Economic Growth**
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- **Week 1: The basic Solow Model and its multiple applications**
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- **Week 2/3: The Solow-Model based empirical methods: Regression analysis, growth accounting and development accounting.**
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- **Week 3/4: Dynamic Optimization and of the Neoclassical Growth Model, One-Sector Model of Endogenous Growth: Physical Capital and Growth**
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- **Week 4: Two-Sector Models of Endogenous Growth: Human Capital and Growth**
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- **Week 4/5:**
- **Technological Change: Models with Expanding variety of products**
- **Technological Change: Models with Improvements in the Quality of Products**
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Part 2

- **Week 6: Directed Technological Change**

- Chapter 15 of Ace book and references there, especially: Acemoglu 1998, 2002b, Acemoglu and Zilibotti 2001 and Caselli and Coleman 2005.

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- **Week 7 Trade and Growth**

- Chapter 19 of Ace book and references there, especially: Acemoglu and Ventura (2002), Caselli and Feyrer (2007) and Rivera Batiz and Romer (1991). Among the empirical papers, Frenkel and Romer 1999 and Sachs and Warner 1995.

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- **Week 8: Structural Change and Economic growth**

- Chapter 20 of Ace book and articles cited there especially: Acemoglu and Guerrieri (2004) Caselli and Coleman (2001), Gollin Parente and Rogerson (2001).

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- **Week 9: Fundamental determinants of differences in economics Performance**

- Ace Book Chapter 4, and references there especially: Mauro 1995), Hall and Jones (1999), Acemoglu Johnson and Robinson 2001, 2002 and Weil 2007.

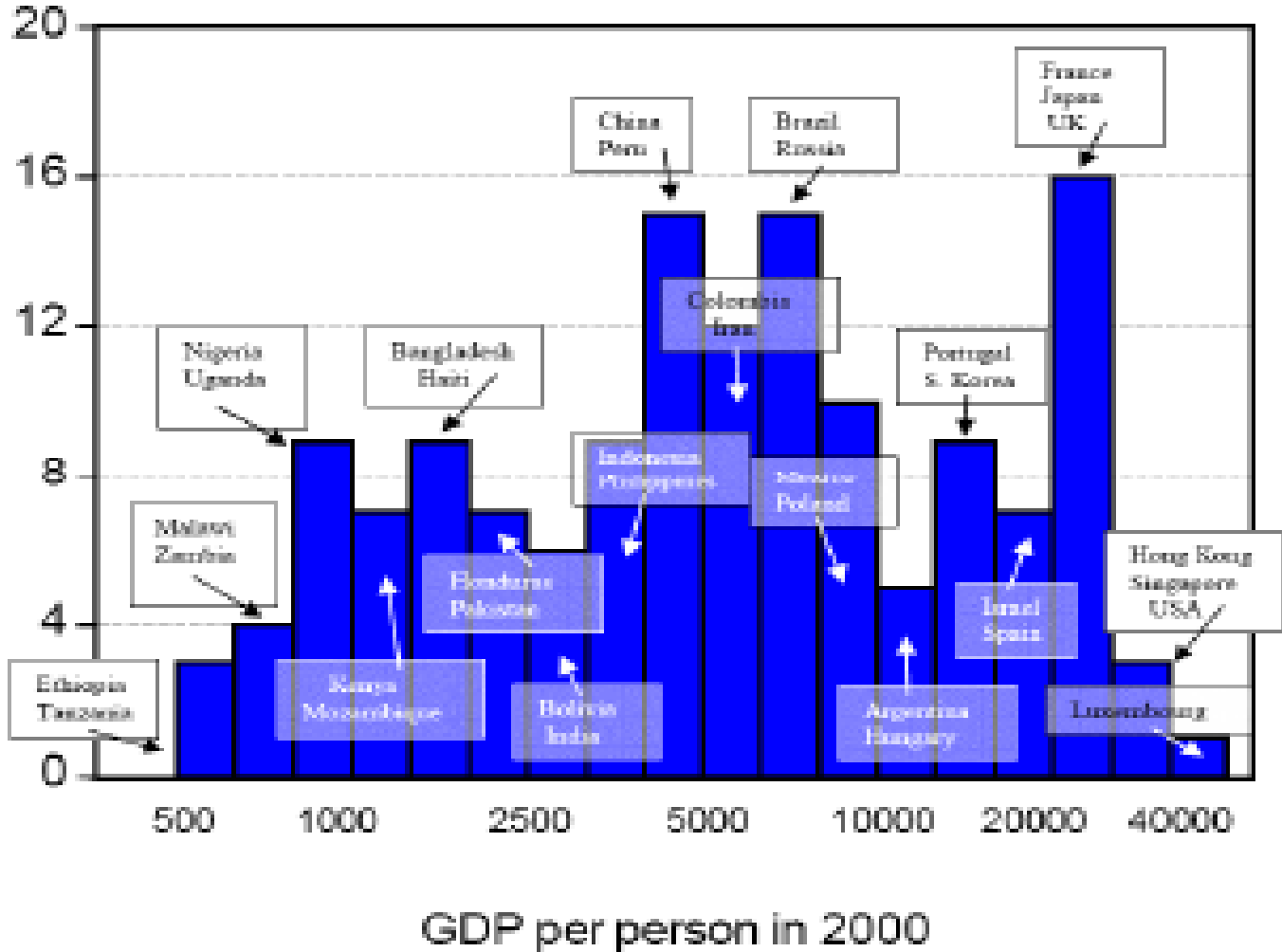
Introduction: A look at some Facts

- Some Important Questions, Themes and Facts
- Some of the Challenges

Economic Growth, Fact 1

- There are very large differences in income per capita or output per worker across countries today.
- Countries at the top of the world income distribution are thirty times as rich as countries at the bottom in PPP adjusted dollars. For example, in 2000, GDP per capita in the United States was \$32500 (valued at 1995 \$ prices). In contrast, income per capita is much lower in many other countries: \$9000 in Mexico, \$4000 in China, \$2500 in India, \$1000 in Nigeria, and much lower in some other sub-Saharan African countries such as Chad, Ethiopia, Mali (all figures adjusted for purchasing power parity)

Distribution of countries average income per person, in a histogram



Smoothed distribution of countries average income per person and its evolution

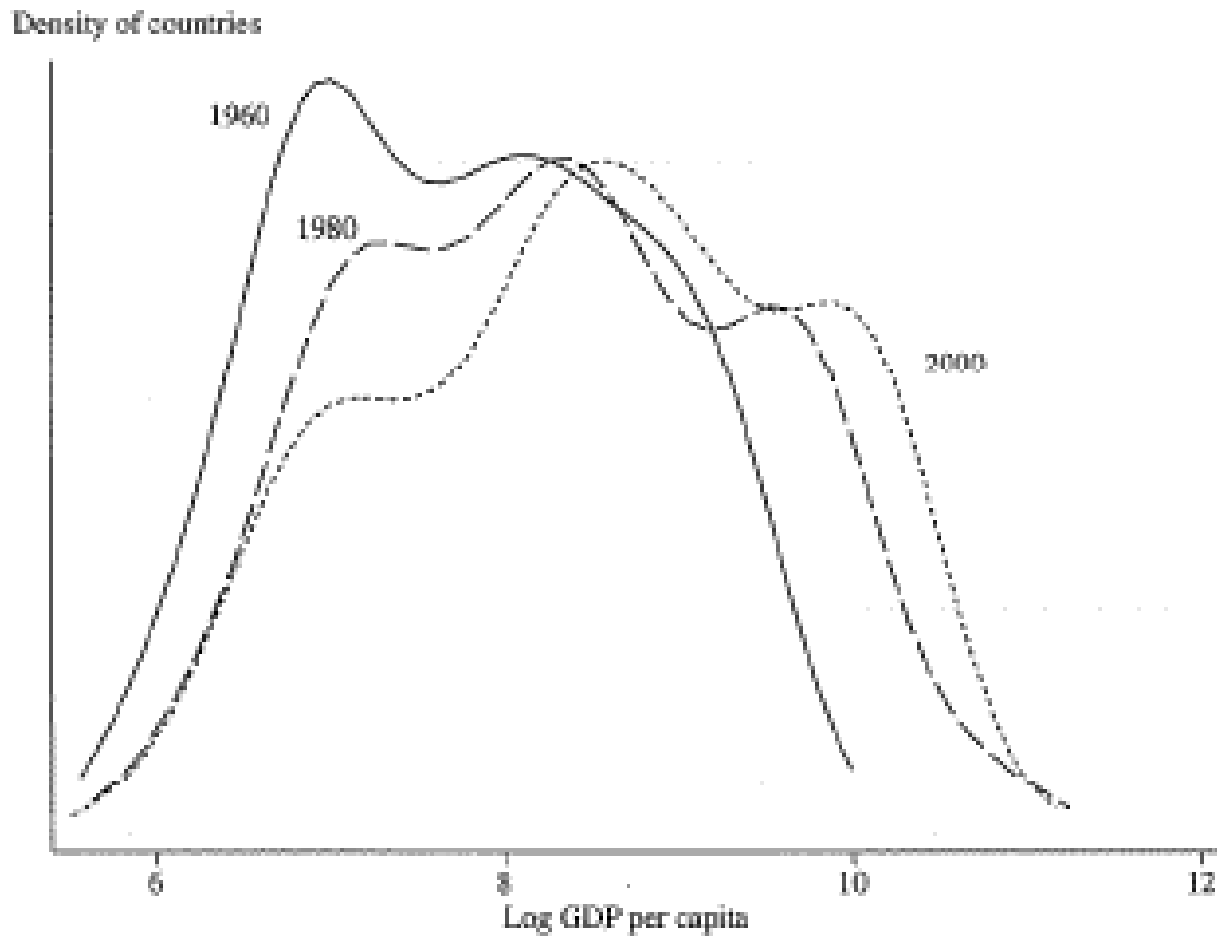


FIGURE 1.2 Estimates of the distribution of countries according to log GDP per capita (PPP adjusted) in 1960, 1980, and 2000.

Smoothed distribution of countries average income per person, population weighted and its evolution

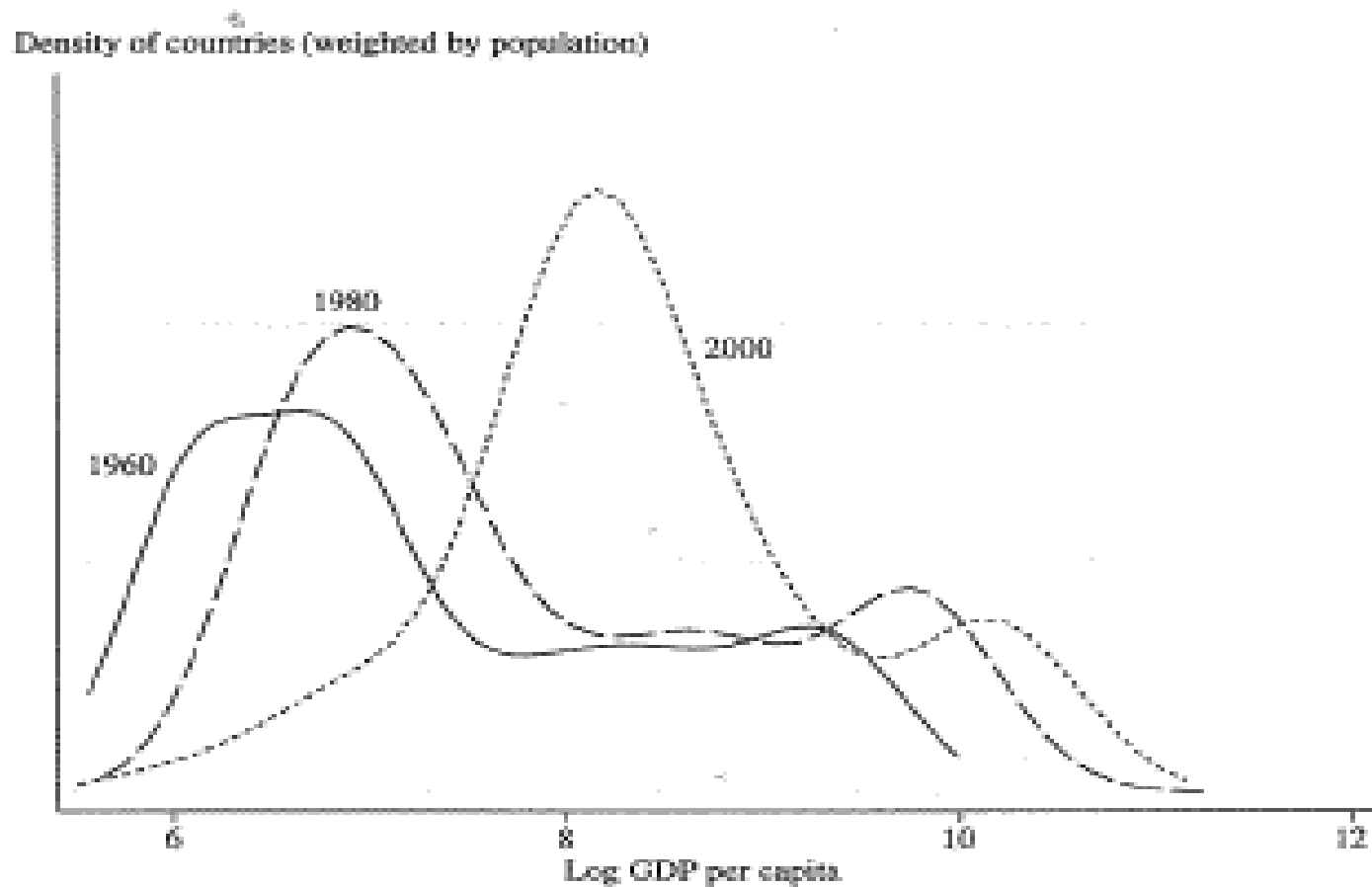


FIGURE 1.3 Estimates of the population-weighted distribution of countries according to log GDP per capita (PPP adjusted) in 1960, 1980, and 2000.

Is GDP a good indicator of development?

Other indicators of Development

- United Nations uses “indices” of human development that account for life expectancy, child mortality, education levels, access to basic resources, sanitation, access to basic rights.
- Other economists have proposed indices of “sustainable” development, accounting for natural resources depletion, leisure time (see the Economist, issue of September 15th on the Sarkozy group).
- Ultimately GDP per capita is very highly but not perfectly correlated with those indicators and is still the most significant measure of standards of living.

Life expectancy and income per person

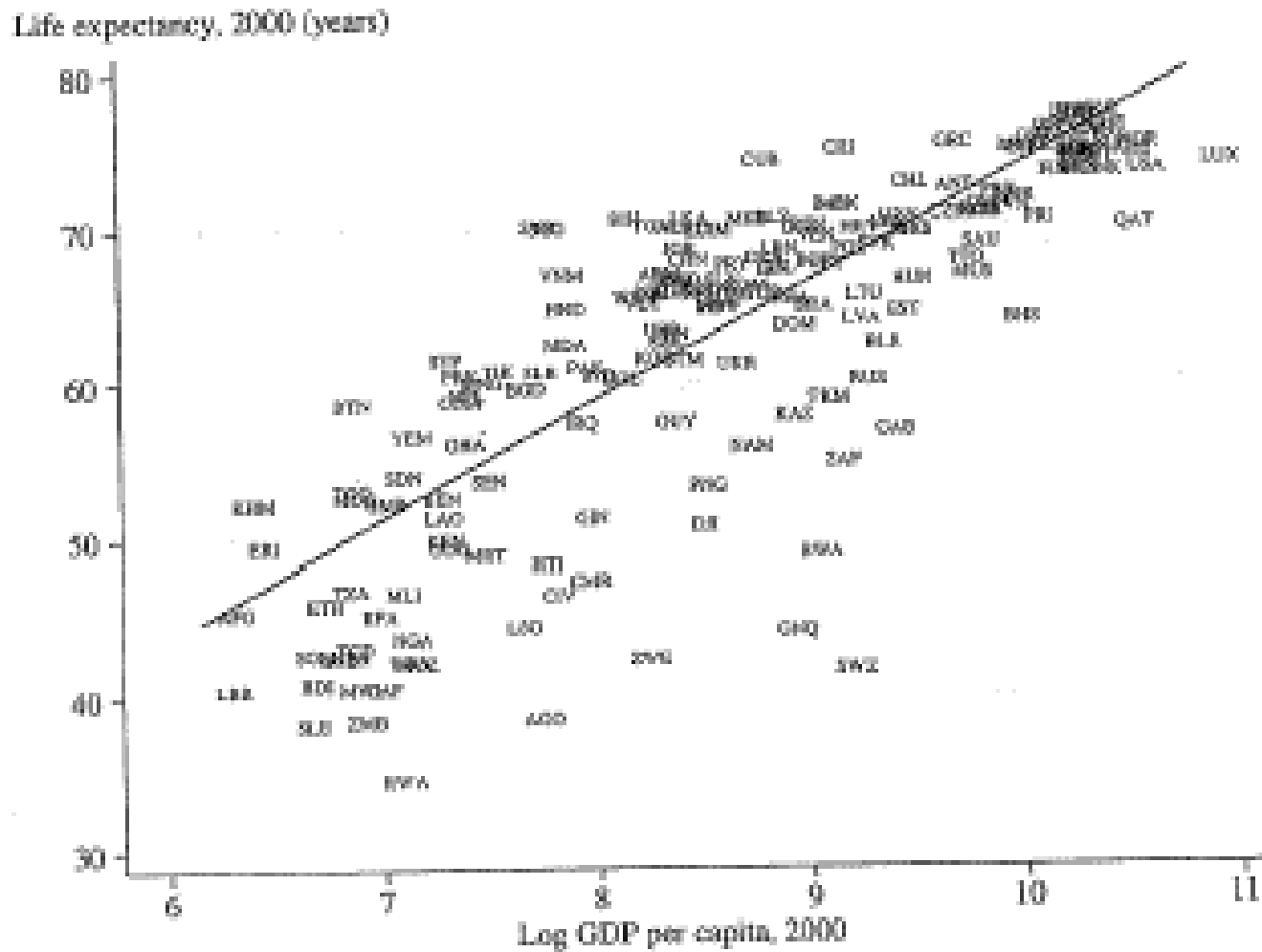


FIGURE 1.6 The association between income per capita and life expectancy at birth in 2000.

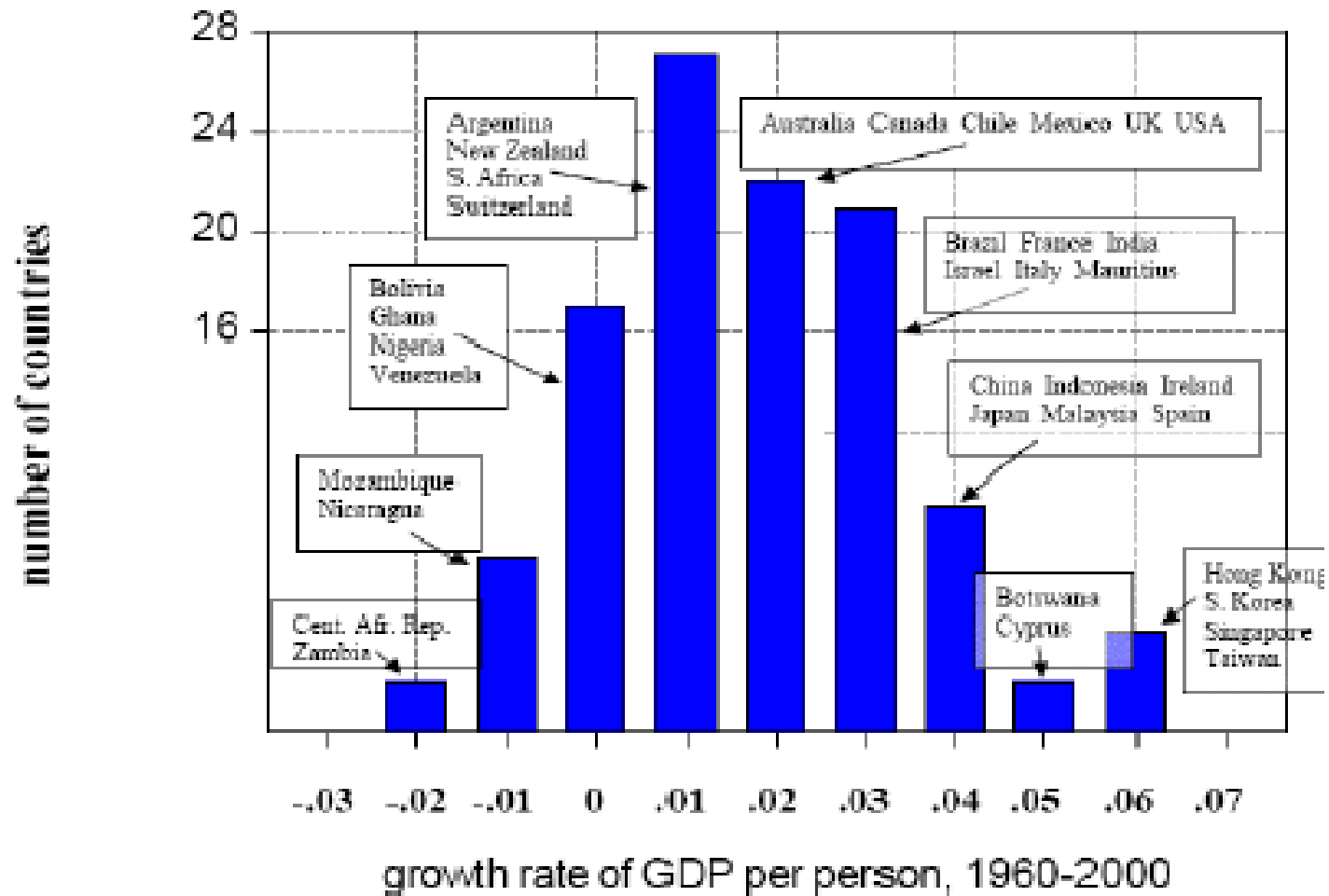
Economic Growth, Fact 2

- Rates of Economic Growth vary substantially across Countries. In fact the stunning difference in income per capita across countries is the effect of the ability of some countries to maintain sustained growth rates of income per capita for the last 2 centuries.
- However at first look it is hard to establish a relation between current levels and current growth rates

Some Representative cases

Country	Income per capita, PPP, in 1960 (constant 2000 \$)	Income per capita, PPP, in 2000 (constant 2000 \$)	Average annual growth rate	Years to Double Income	Overall increase
RICH					
USA	13,426	36,422	2.5%	29	2.7
JAPAN	4,971	26,994	4.1%	17	5.4
UK	10,583	24,275	2.1%	34	2.3
FRANCE	8,560	22,357	2.7%	26	2.8
NEW RICH (MIRACLES)					
HONG KONG	3,380	29,208	5.5%	13	8.6
SOUTH KOREA	1,635	17,368	6.1%	11	10.6
POOR AND CATCHING UP					
CHINA	745	4,099	4.3%	16	5.5
INDIA	926	2,711	2.7%	26	2.9
INDONESIA	1,024	3,984	3.4%	21	3.9
MIDDLE AND STABLE					
MEXICO	4,354	9,586	1.9%	36	2.2
POOR AND STAGNATING					
ETHIOPIA	525	634	0.4%	150	1.2
BURKINA FASO	825	1,046	0.6%	120	1.2
BAD NEWS/DISASTERS					
ARGENTINA	8,064	12,014	1.0%	71	1.5
VENEZUELA	8,577	7,023	-0.5%	NEVER	0.8
MALI	982	969	-0.03%	NEVER	0.98
CHAD	1,212	908	-0.7%	NEVER	0.75

Distribution of growth rates of income per person

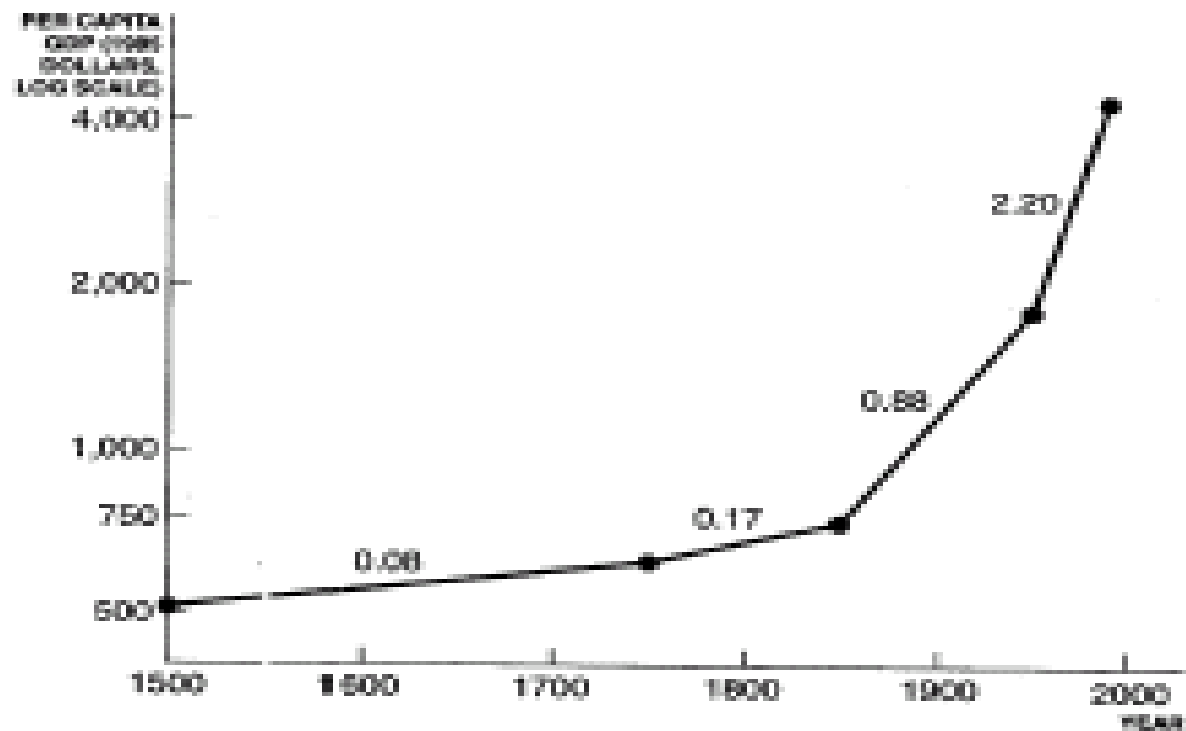


Economic growth, Fact 3

- In the very long run Growth Rates are not constant. In Fact Positive Economic Growth is a relatively recent fact in the World. The current income inequalities originate in large part from differences in growth rates in the last 200 years
- For the world as a Whole growth rates were close to 0 for most of the history and they rose sharply in the nineteenth and twentieth century.
- Big bang and Great Divergence

Big Bang

FIGURE 1.3 WORLD PER CAPITA GDP AND GROWTH RATES, 1500-1999

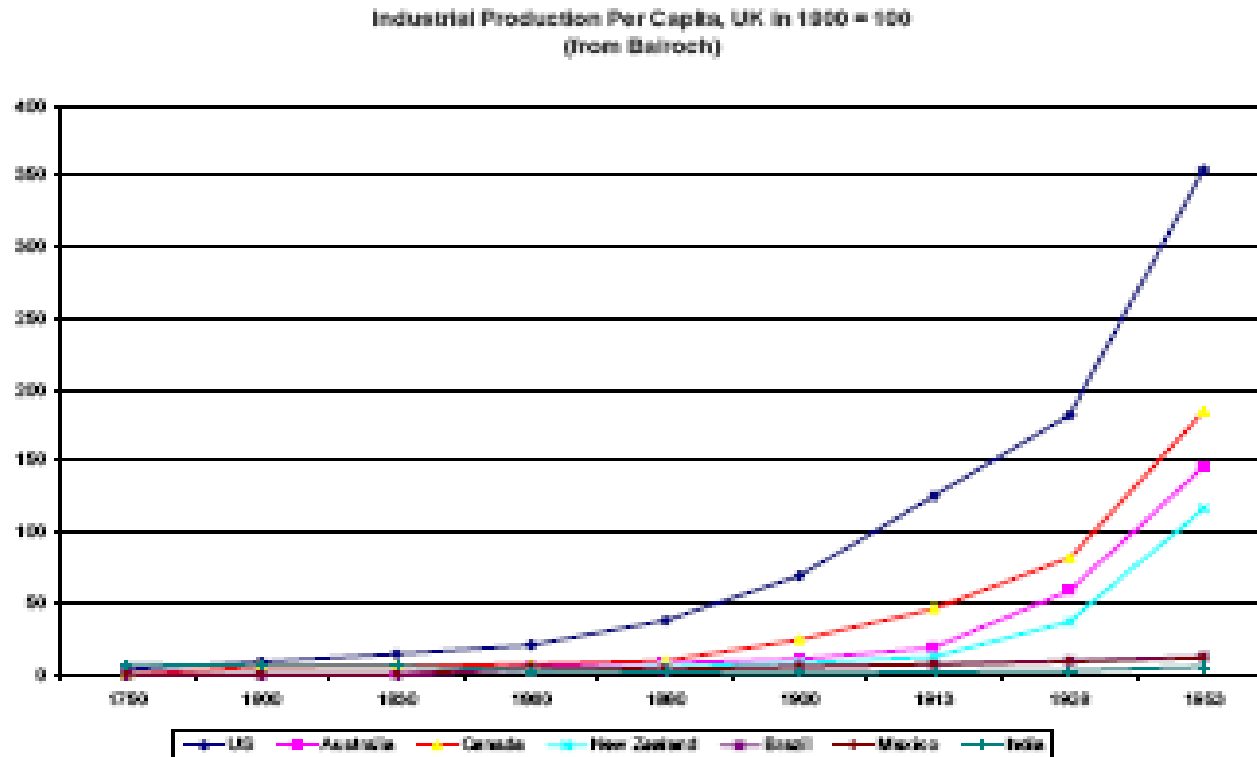


SOURCE: Computed from Lucas (1996) and Maddison (1996).

Note: The numbers above each line segment are average annual growth rates.

Great Divergence, Strict version

Reversal, Industrialization and Divergence



Great divergence: Qualified version

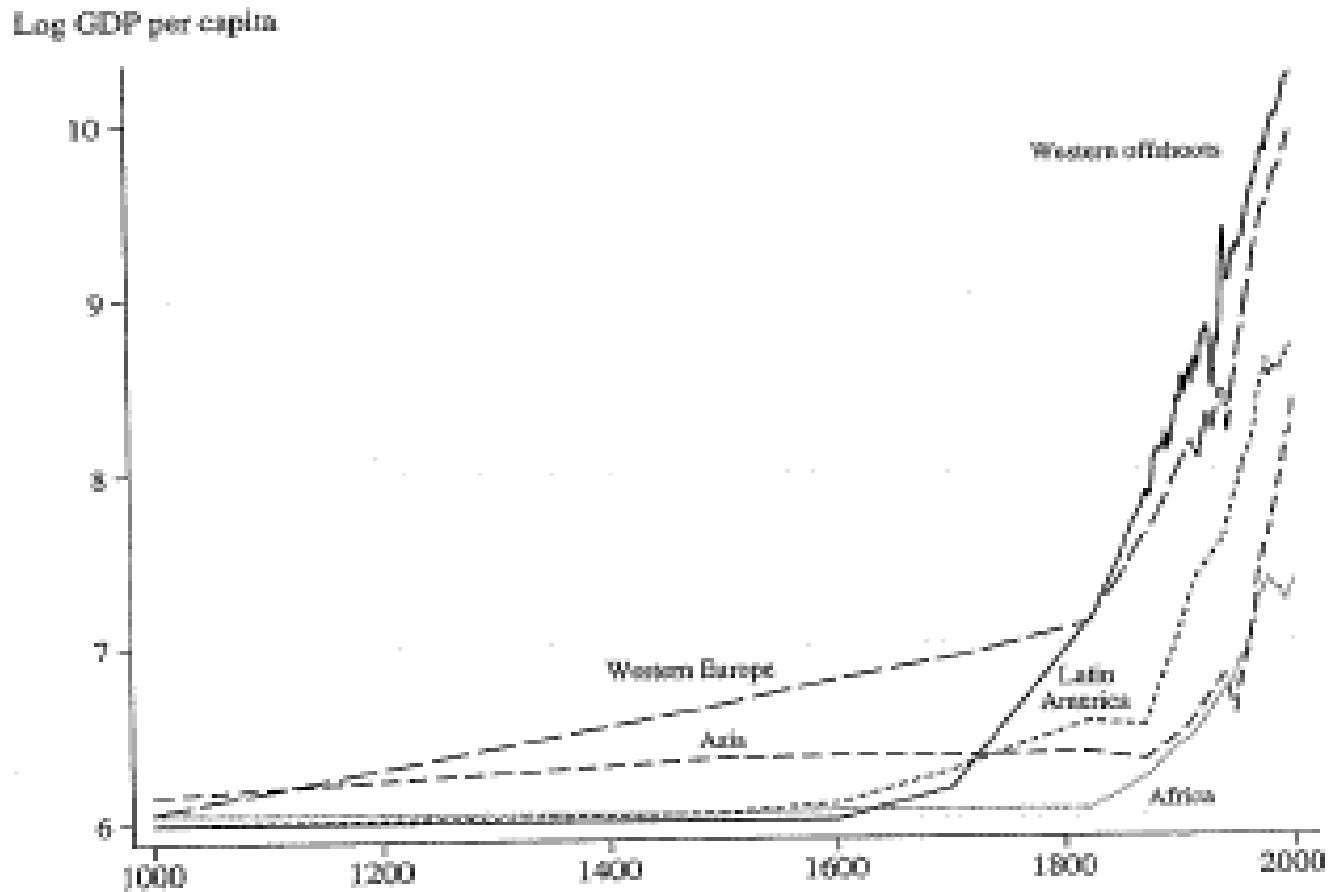


FIGURE 1.11 The evolution of average GDP per capita in Western offshoots, Western Europe, Latin America, Asia, and Africa, 1000–2000.

The actual data since 1820: broad picture

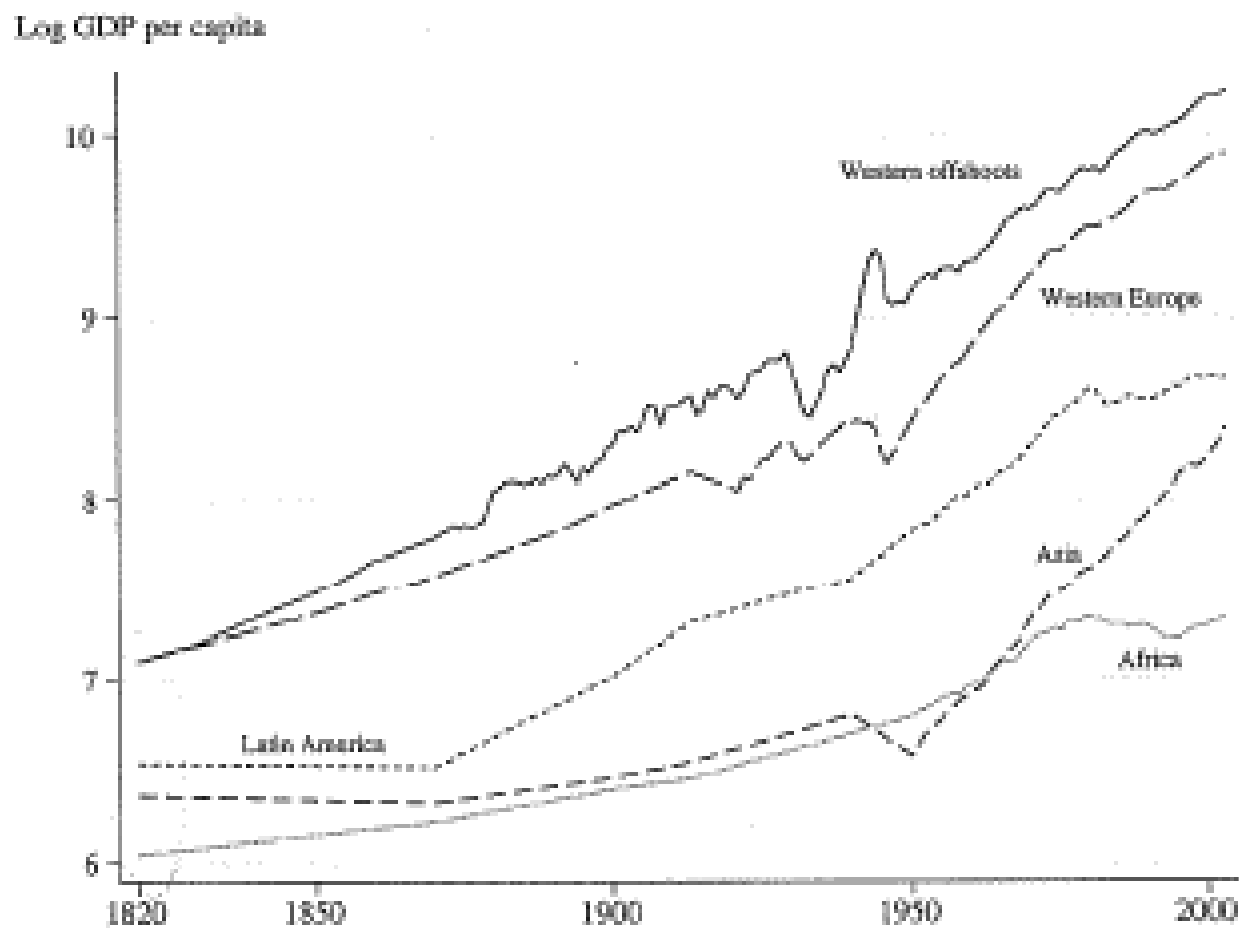


FIGURE 1.10 The evolution of average GDP per capita in Western offshoots, Western Europe, Latin America, Asia, and Africa, 1820–2000.

Real data: more nuanced picture

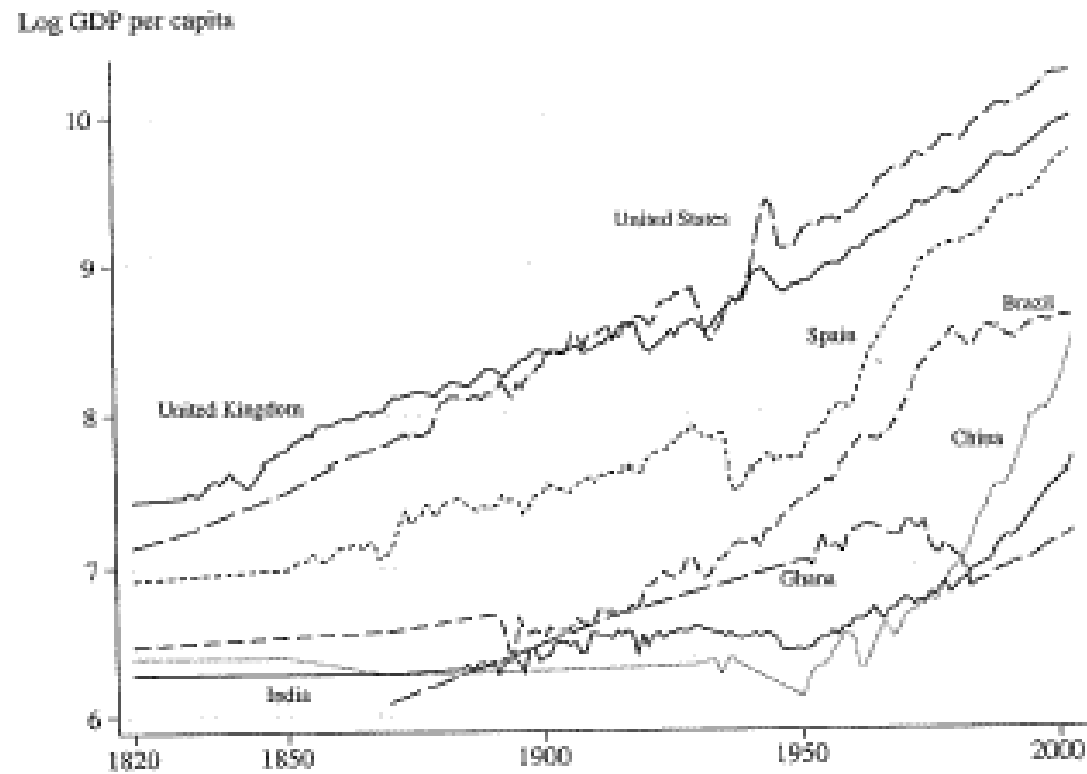


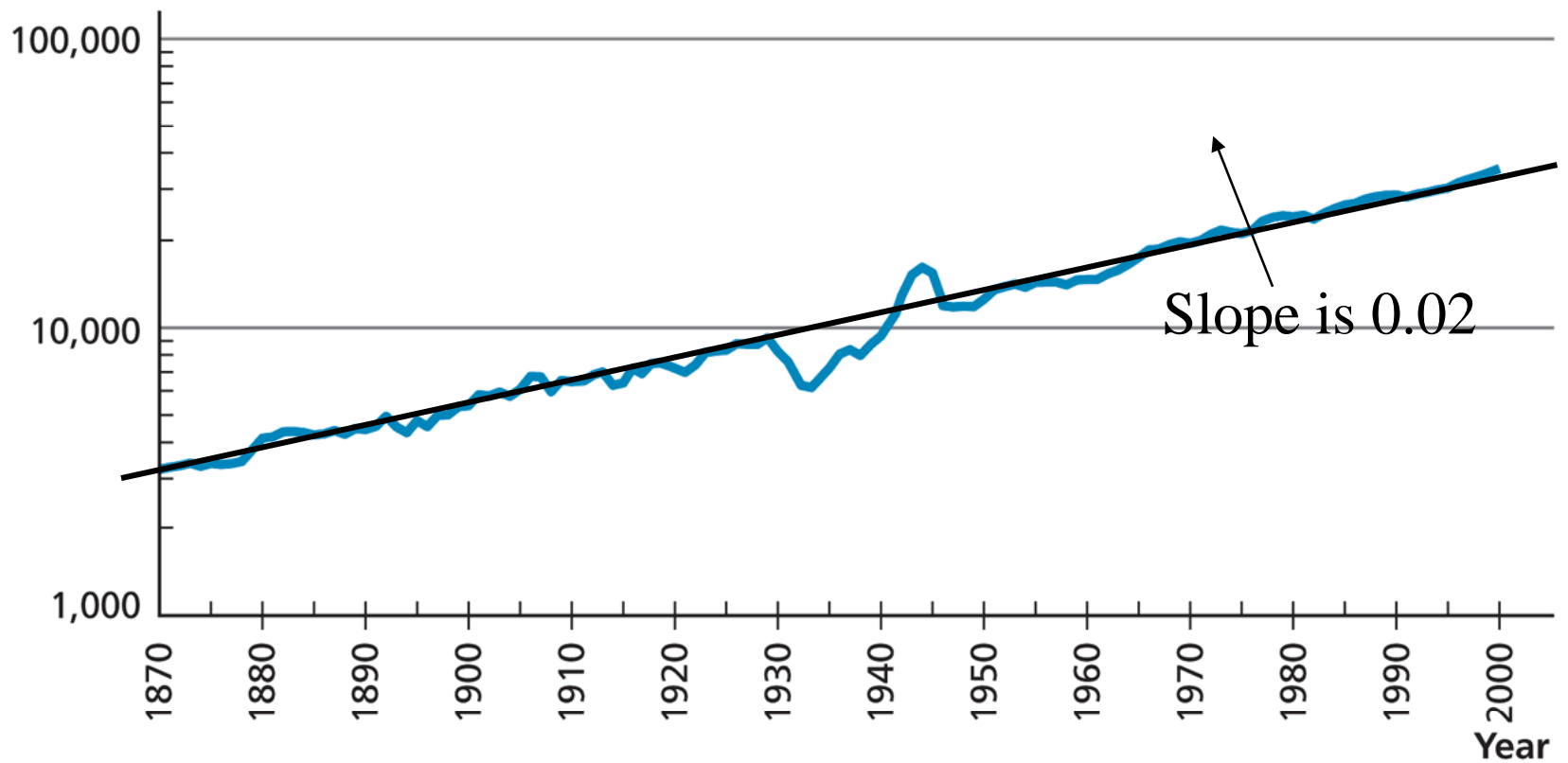
FIGURE 1.12 The evolution of income per capita in the United States, the United Kingdom, Spain, Brazil, China, India, and Ghana, 1820–2000.

Remarkable Stability of US growth rate of income per capita in the last 100 years

FIGURE 1.4

GDP per Capita in the United States, 1870–2000 (Ratio Scale)

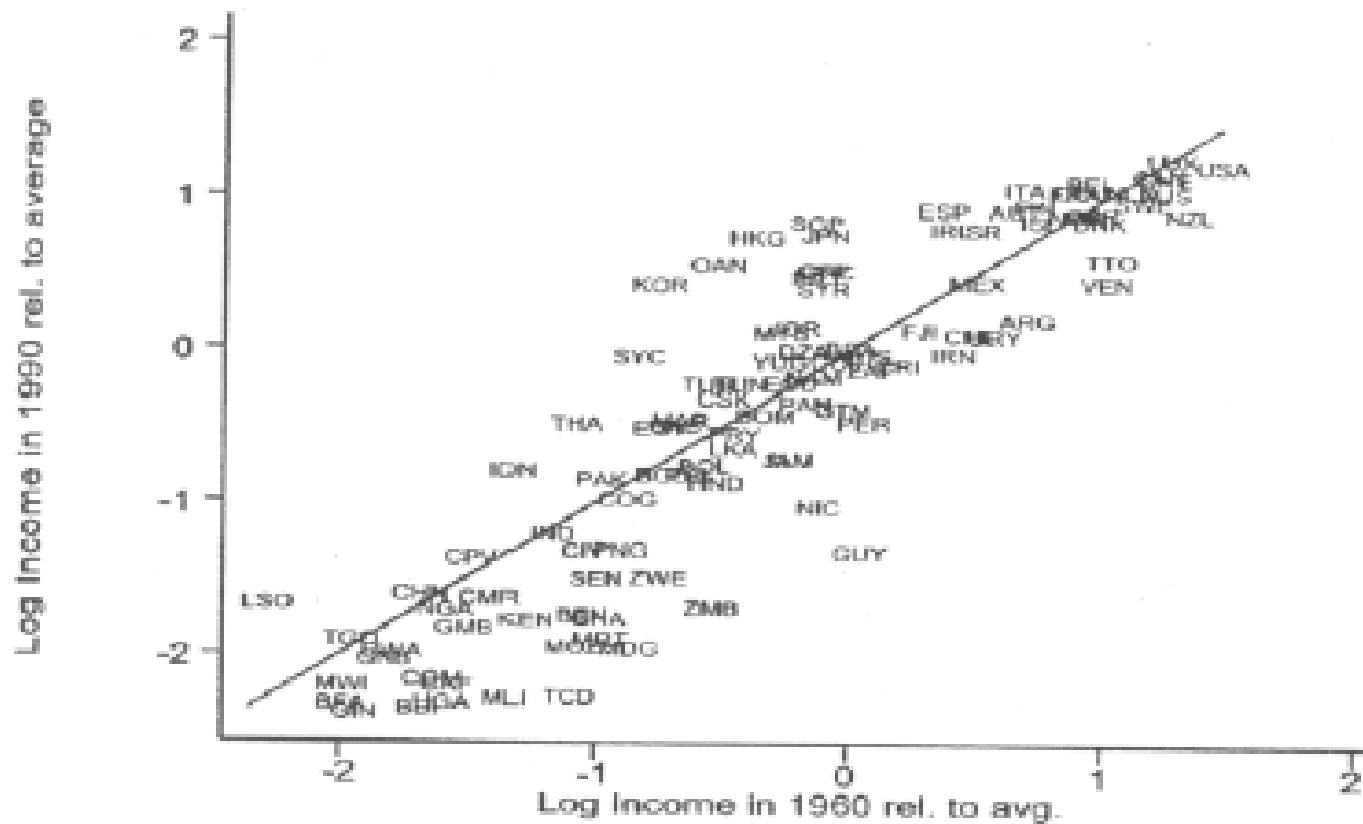
GDP per capita (2000 dollars, ratio scale)



Economic Growth, Fact 4

- There seem to be Divergence in income per capita of countries over the long run with high stability in the Ranking. But:
 - A country's Relative position in World Distribution of per capita income is not immutable. Some countries move from "poor" to "rich" and other move from "rich" to "poor". In general however the ranking is pretty stable.
 - There is convergence in a sub-group
 - The incredible variety of success and disaster stories in the last 50 years is the best source to test theories.

Correlation of income per person over 40 years



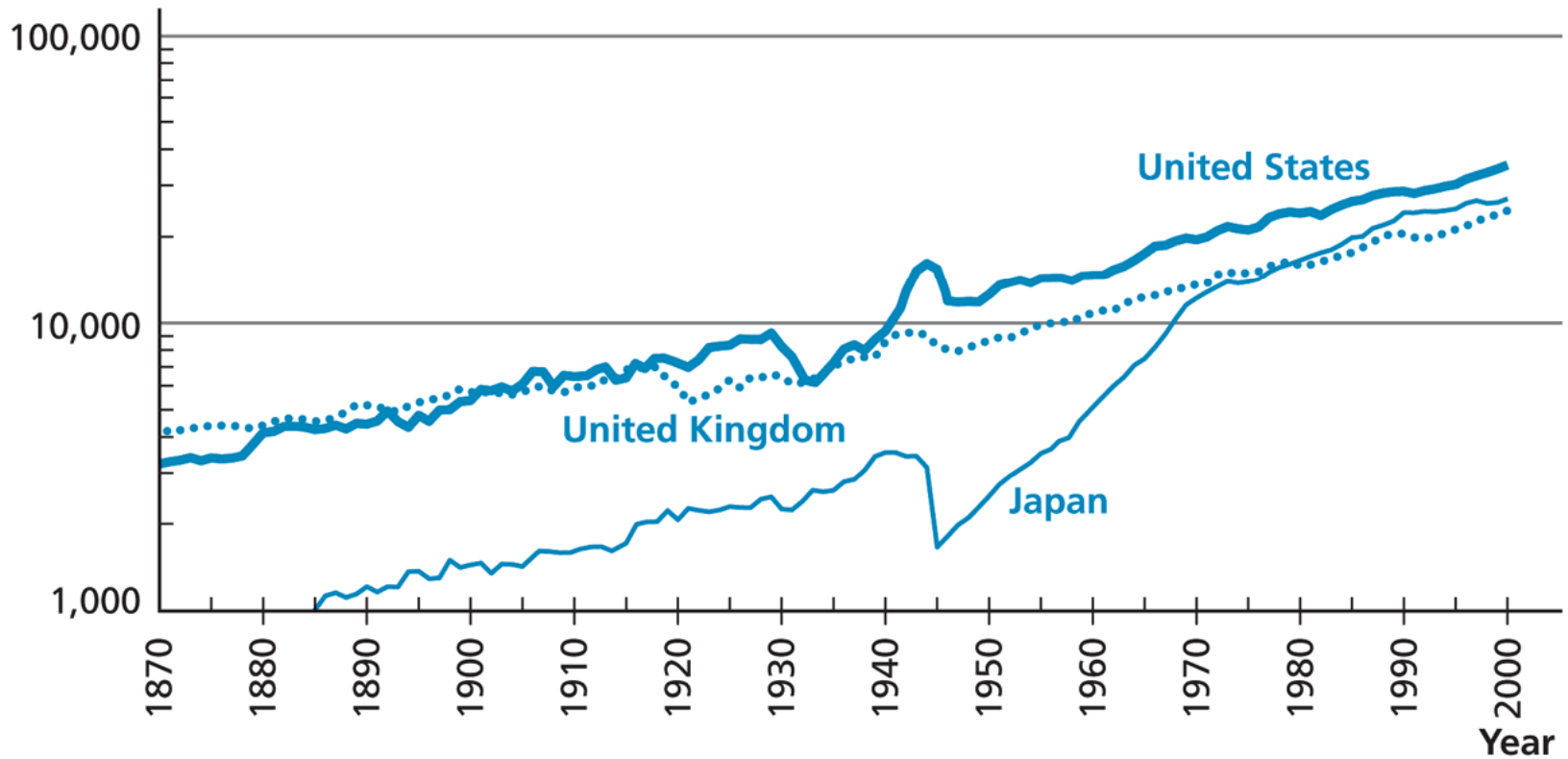
Economic Growth, Fact 5

- There seems to be convergence near the Economic Frontier. It is harder to have very high growth rates when an economy is “at the frontier” of development” than when it is catching up to the frontier.
- Example: Japan, European Countries post WWII.
- Why? When a country is catching-up it can “imitate” when it is the leader it has to break the ground.

FIGURE 1.5

GDP per Capita in the United States, the United Kingdom, and Japan, 1870–2000

GDP per capita (2000 dollars, ratio scale)



Source: Maddison (1995).

Convergence among OECD countries: growth rates are negatively related with initial levels

Average growth rate of GDP, 1960–2000

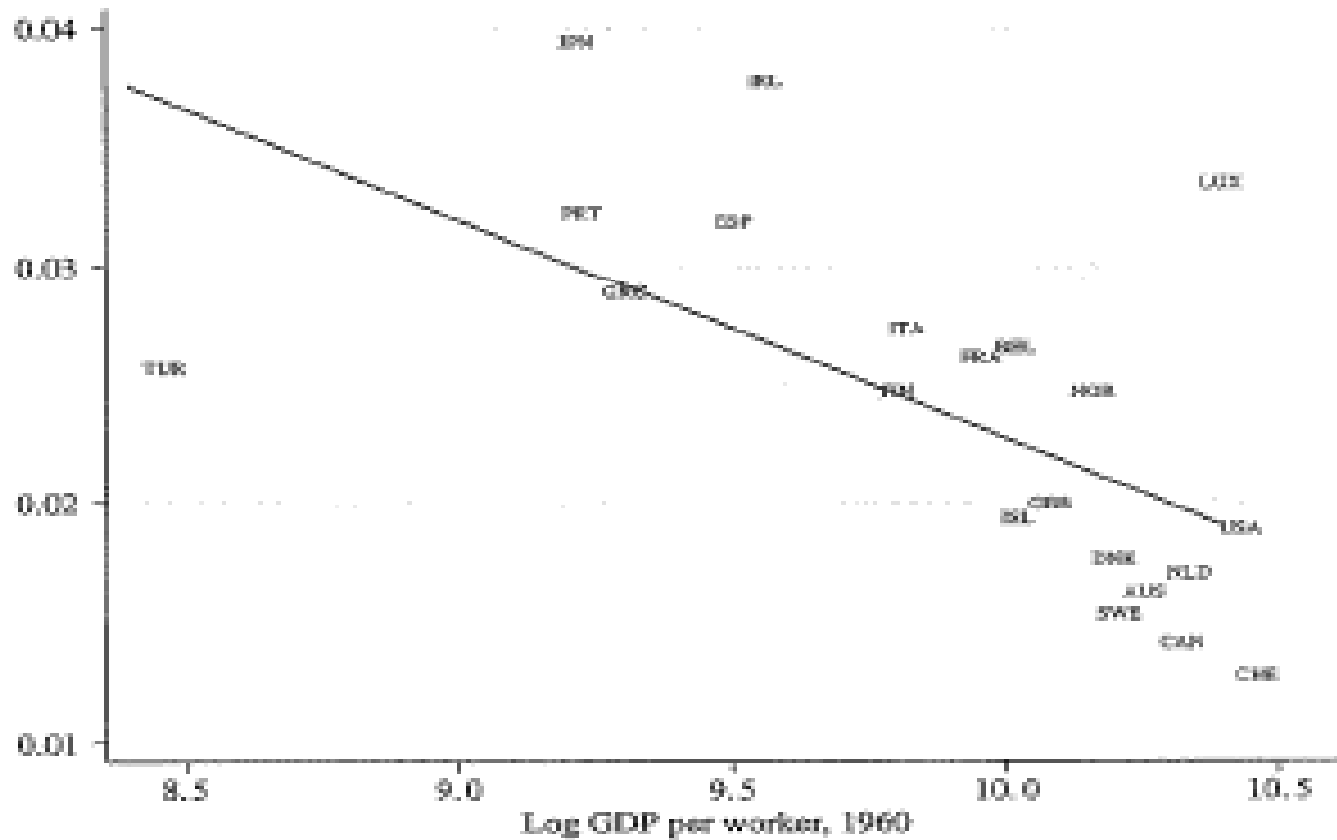


FIGURE 1.14 Annual growth rate of GDP per worker between 1960 and 2000 versus log GDP per worker in 1960 for core OECD countries.

Convergence or Divergence?

- Has income per capita across countries converged or diverged in the last 50 years?
- Hard to tell, considering all countries divergence prevails. Considering a sub-group of more advanced countries convergence took place.
- With the fast growth of China and India convergence seems to prevail overall in the last 20 years.

Economic growth, Challenge 1

- The major pattern to be explained is why there are such large differences in income per capita and worker productivity across countries. This immediately takes us to questions of why some countries grow (or have grown) while other countries have failed to grow and stagnated.
- Are policy responsible? Or more general social incentives? Or more deeply rooted characteristics as genetics and culture

Economic growth, Challenge 2

- The relative stability of the postwar income distribution has suggested to many economists that we should look for differences across countries leading to very large “permanent” differences in income, but not necessarily large “permanent” differences in growth rates in the recent decades.
- What affects the “long-run” ranking of countries”?

Economic growth, Challenge 3

- It is important to understand why even in this age of free-flow of technology some countries are growing faster than others.
- Equally puzzling is how the very large income differences we observe today can persist in this age of free-flow of technology, trade and financial integration.

Economic growth, Challenge 4

- The divergence from the 19th century to today suggests that we might want to look for a set of theories where the large differences in income per capita, at least to some extent, reflect technological or institutional changes that took place during the 19th and early 20th centuries.
- Some countries may have taken advantage of industrialization opportunities, while other societies have failed to do so, or may have only started adopting technologies very late.

A useful Scheme

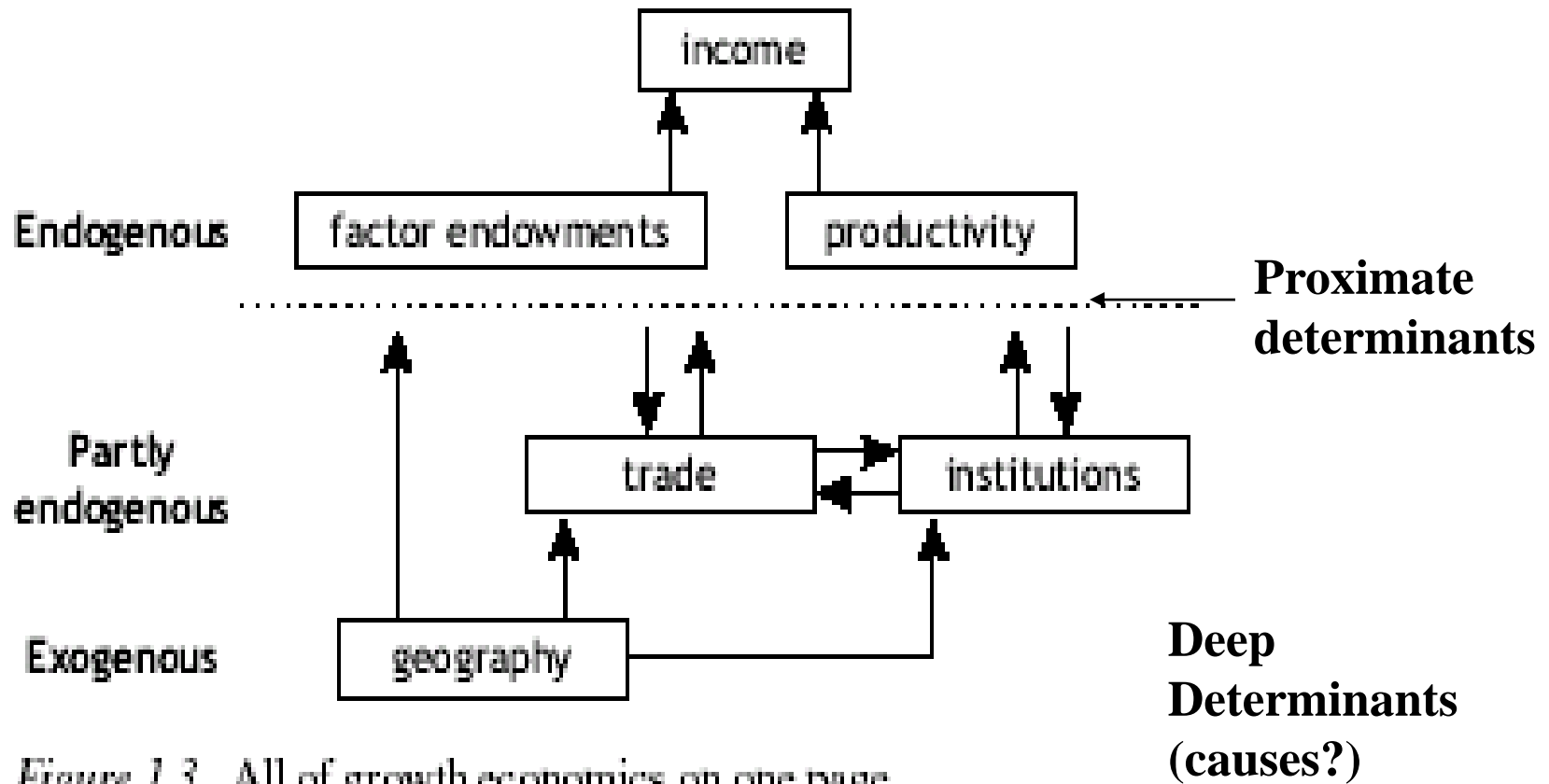


Figure 1.3. All of growth economics on one page

Correlate number one: Investment in physical capital

Average growth rate of GDP per capita, 1960–2000

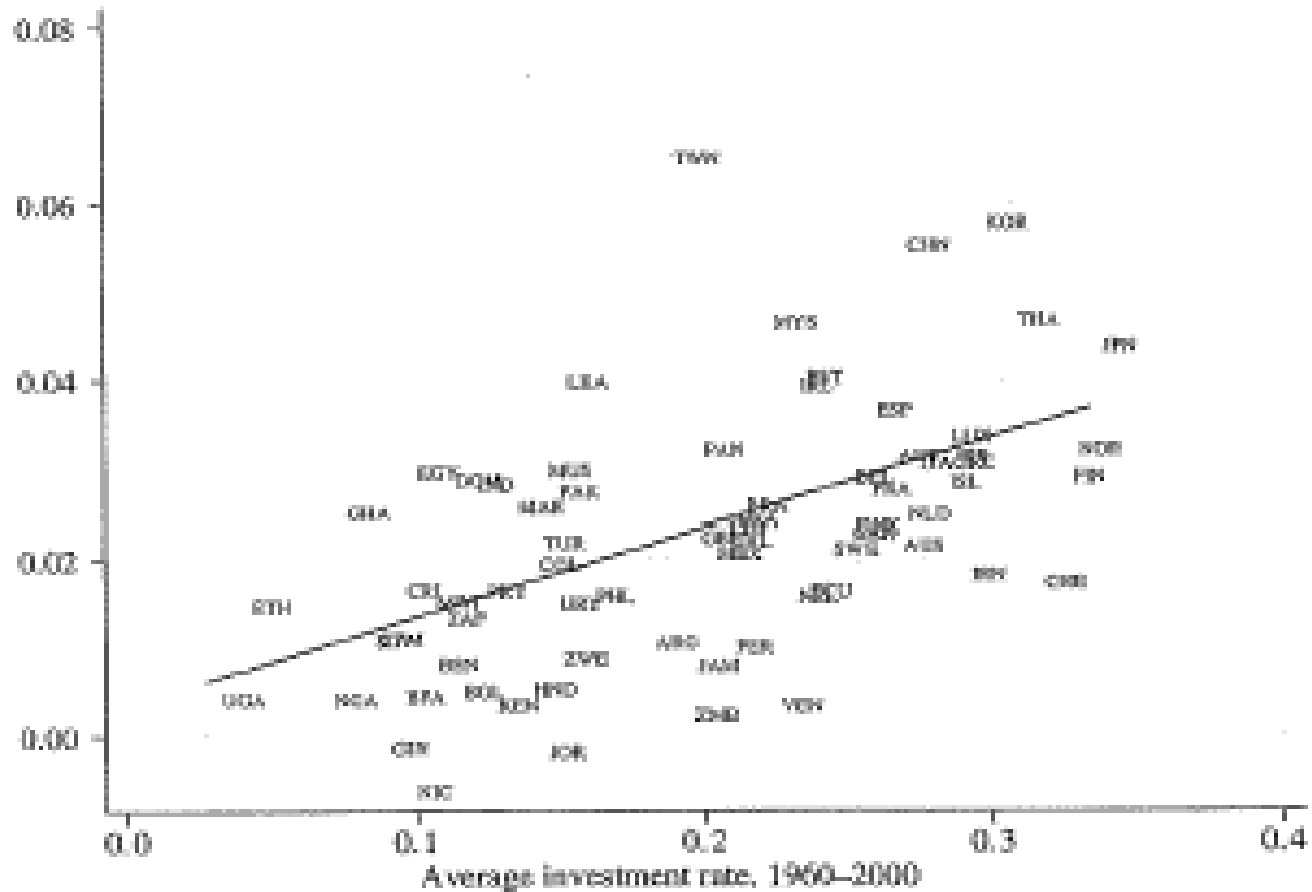


FIGURE 1.15 The relationship between average growth of GDP per capita and average growth of investments to GDP ratio, 1960–2000.

Correlate Number two: Investment human capital

Average growth rate of GDP per capita, 1960–2000

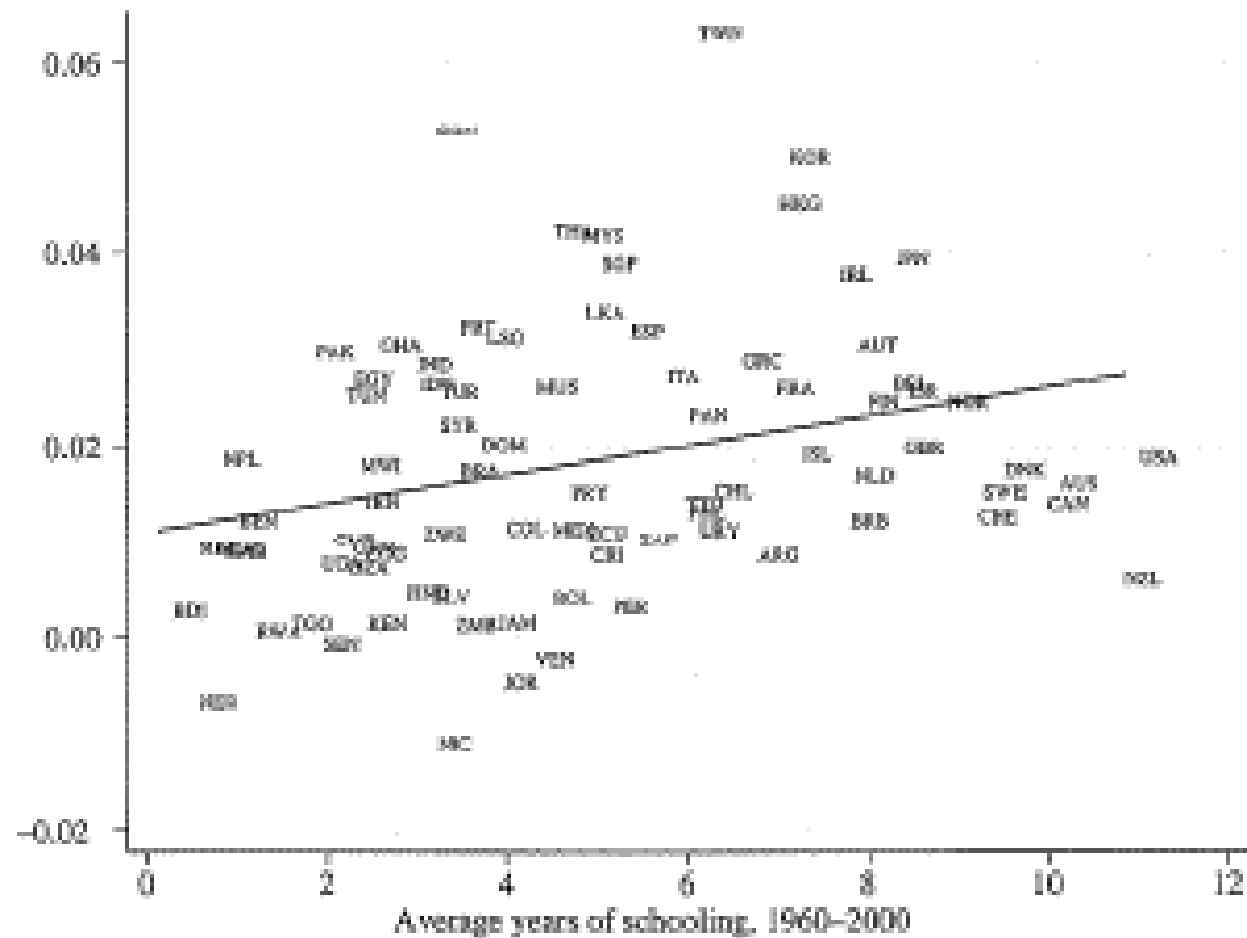


FIGURE 1.16 The relationship between average growth of GDP per capita and average years of schooling, 1960–2000.

Going beyond the proximate mechanisms and understand the causes

- Openness?
- Institutions?
- Incentives to Technological innovation?
- Cultural-Social forces?
- Other structural Changes in methods of production (From Agriculture to Manufacturing)?