Theories of Economic Growth - Intro

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Aim of the course

- Introduce the main facts established in the field of economic growth.
- Present the landscape of advanced theories (in detail!) to explain this facts.
- Develop important technical tools to read current literature on the field.

The course is mainly theoretical!

Topics covered

In parenthesis reference chapters in Acemoglu's book

- Introduction (1)
- Taking Solow seriously & Convergence (2-4)
- AK model and Convergence (11)
- Structural Change (20)
- Growth and the demography (UGT)
- Growth in an international context (19)

References

- Acemoglu, D, Introduction to Modern Economic Growth, Princeton University Press, 2009.
- Galor, O. 2005 "From Stagnation to Growth: Unified Growth Theory", in Aghion, P. and Durlauf, S.N. (eds.), Handbook of Economic Growth, North Holland, Elsevier Academic Press, Vol. 1A, pp. 171-293.

Suggested Math Textbooks

- Simon, Carl P., and Lawrence Blume, *Mathematics for Economists,* Norton;
- Alpha Chiang (1984), *Fundamental Methods of Mathematical Economics*, McGraw-Hill.
- Alpha Chiang (1992), *Elements of Dynamic Optimization*, McGraw-Hill.
- de la Fuente, *Mathematical Methods and Models for Economists,* Cambridge University Press, 2000.

Grading

- Final Exam (80 %)
- 3 Assignments (20 %). (Optional)

Contact Details

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Empirical Growth - Motivation

- We start with the most basic macroeconomic aggregate:
- Income.
- Macro-1 has an emphasis on *Long-run Economic Growth*.
- Therefore, we start with the empirically observed long-run behavior of national income, and its determinants.

Empirical Growth - Motivation

A Reminder: Always nice to see the data first before constructing a theory: This gives us a framework for evaluating our model and helps in organizing our thinking about economic phenomena such as growth! (Important to link Objective-Motivation-Mechanism).

Distribution of countries' GDP PPP-adjusted

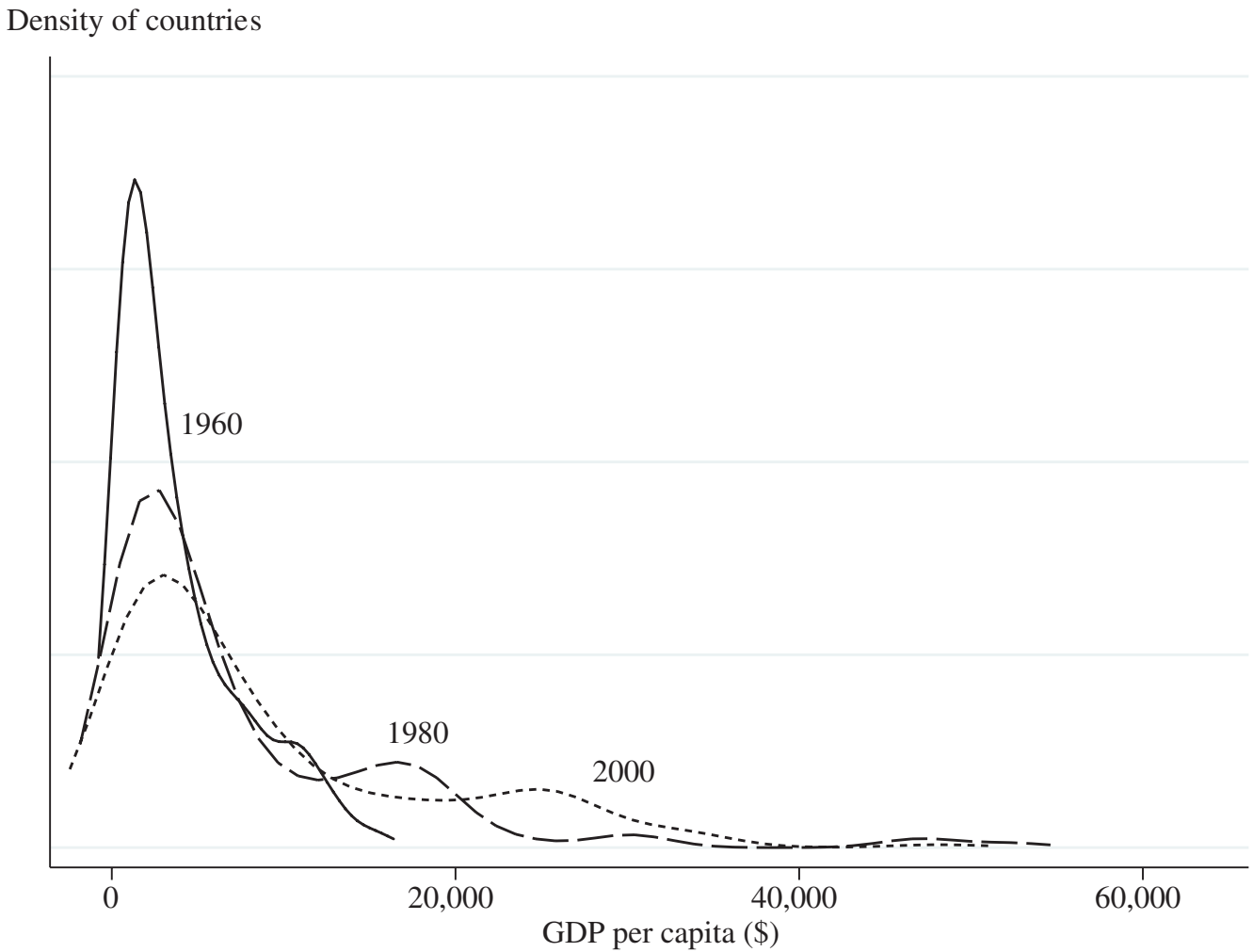


FIGURE 1.1 Estimates of the distribution of countries according to PPP-adjusted GDP per capita in 1960, 1980, and 2000.

Distribution of countries' GDP PPP-adjusted

Three things to note here:

- There is a distribution of countries: not all have same levels of GDPpc
- The distribution shifts to the right: the world economy grows
- Some countries do not show much progress

Taking logs

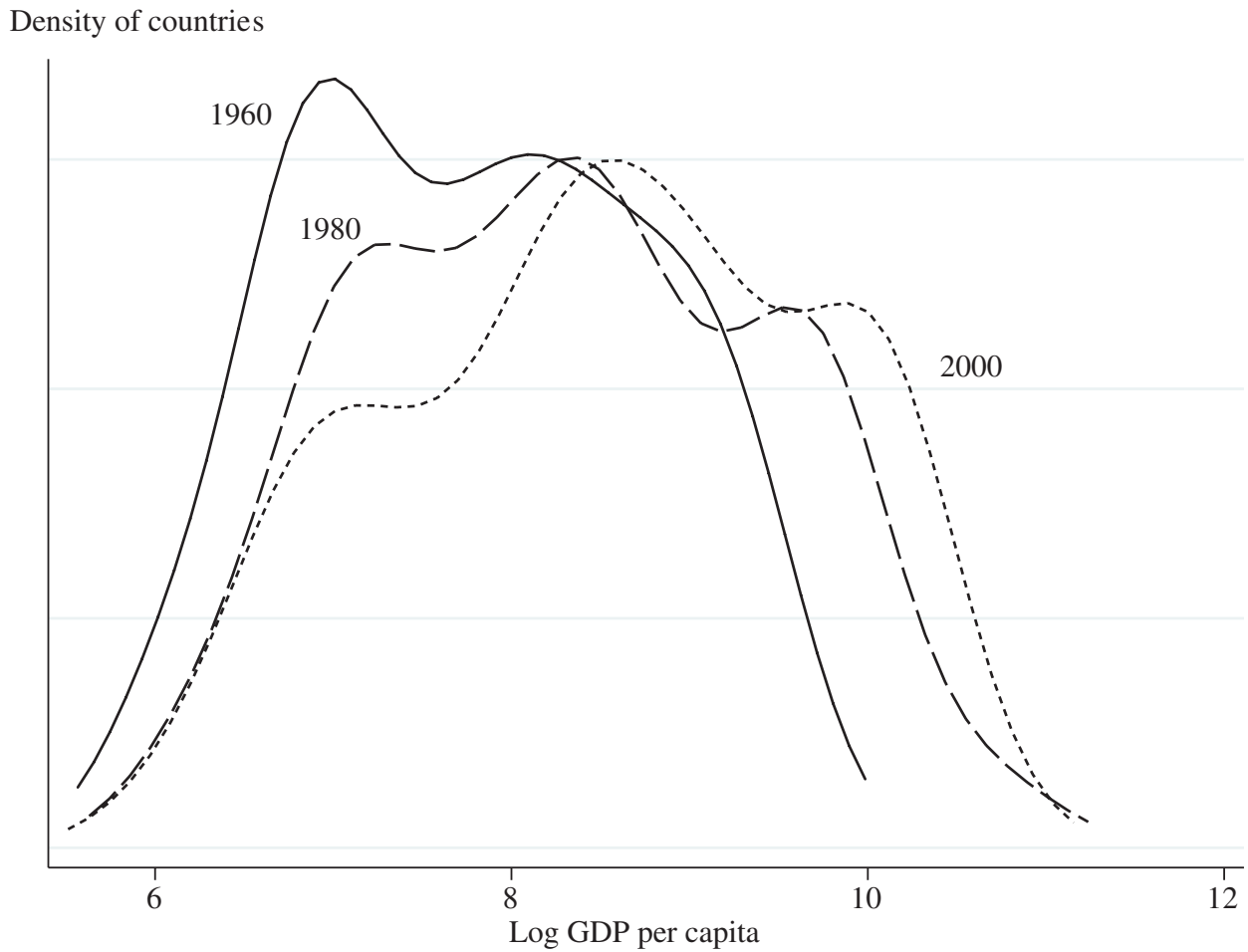
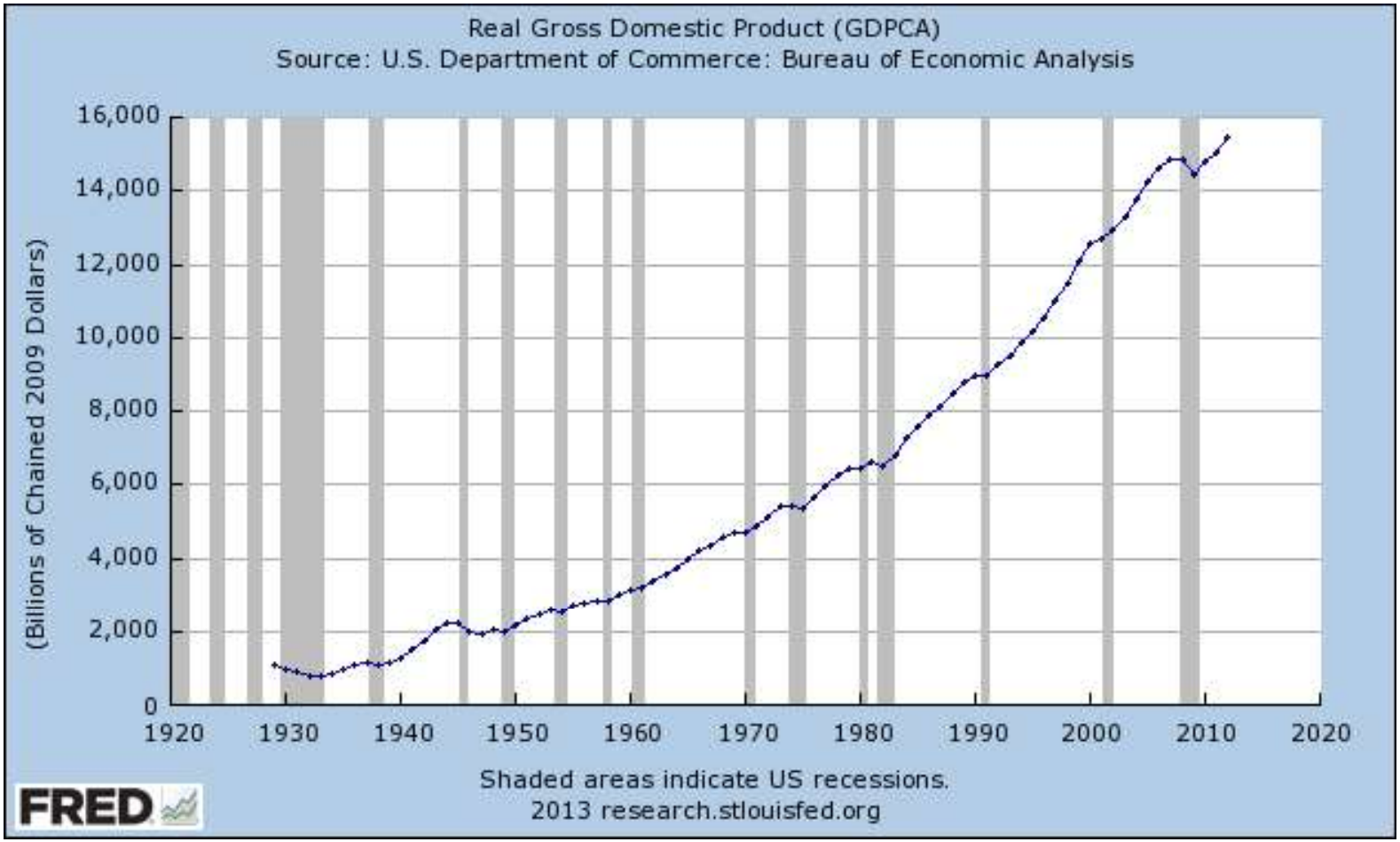


FIGURE 1.2 Estimates of the distribution of countries according to log GDP per capita (PPP adjusted) in 1960, 1980, and 2000.

Why did we take logs?



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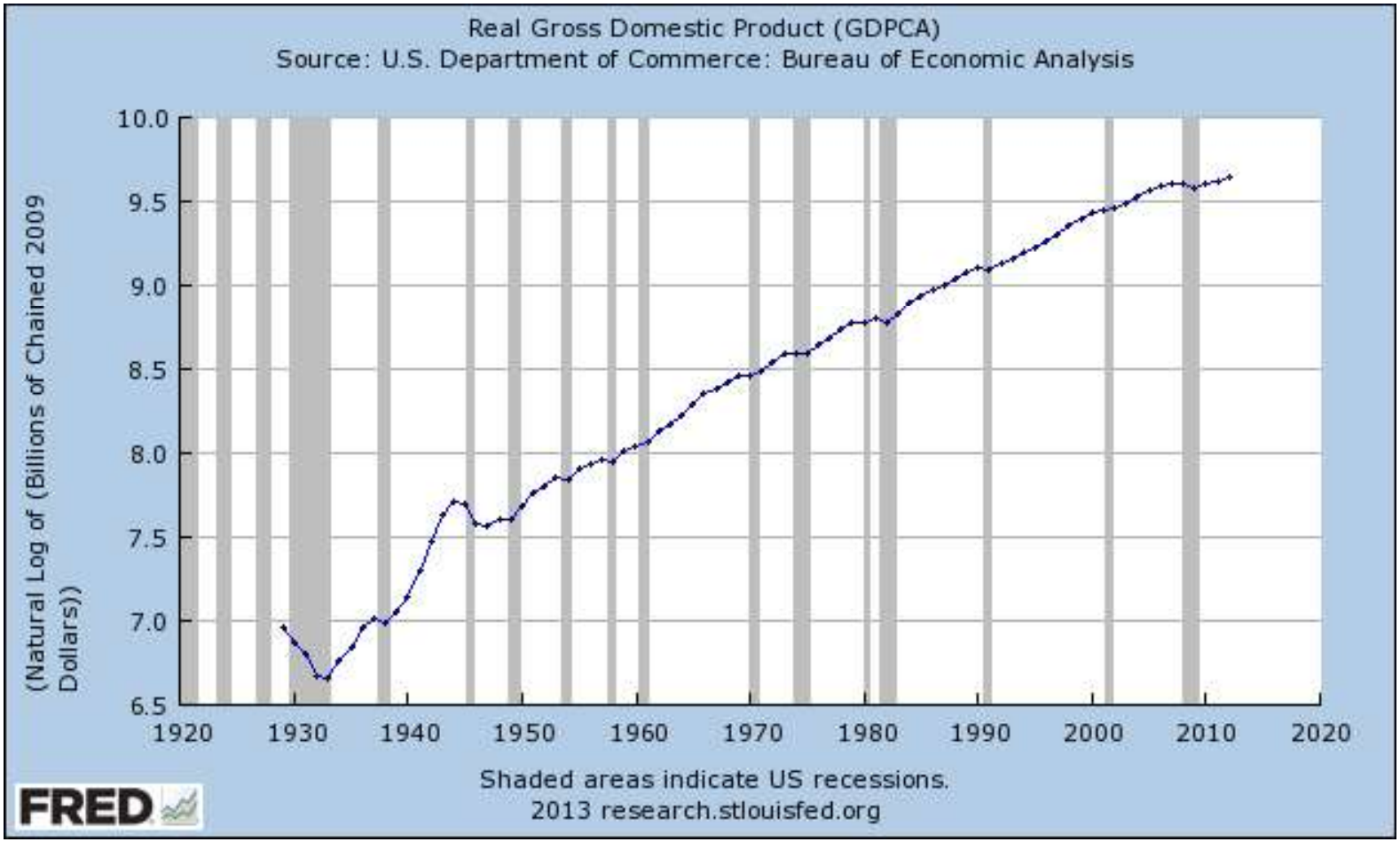

Why did we take logs?

- Because the slope of the log(GDP) plot gives the growth rate:

$$\begin{aligned}\frac{d\log Y}{dt} &= \frac{d\log Y}{dY}\frac{dY}{dt} \\ &= \frac{1}{Y}\frac{dY}{dt} \\ &= \frac{\Delta Y}{Y}\end{aligned}$$

- Also, if the series is non-stationary, it produces a stationary plot.

Growth facts

- The previous figures show how the world is increasingly unequal (in terms of countries).
- Can we say the same about people?
  - Consider a figure with $GDPpc * Pop$.
  - Approximates the income distribution of world population, giving each individual the average GDP of the country they live in.

Weighting for population

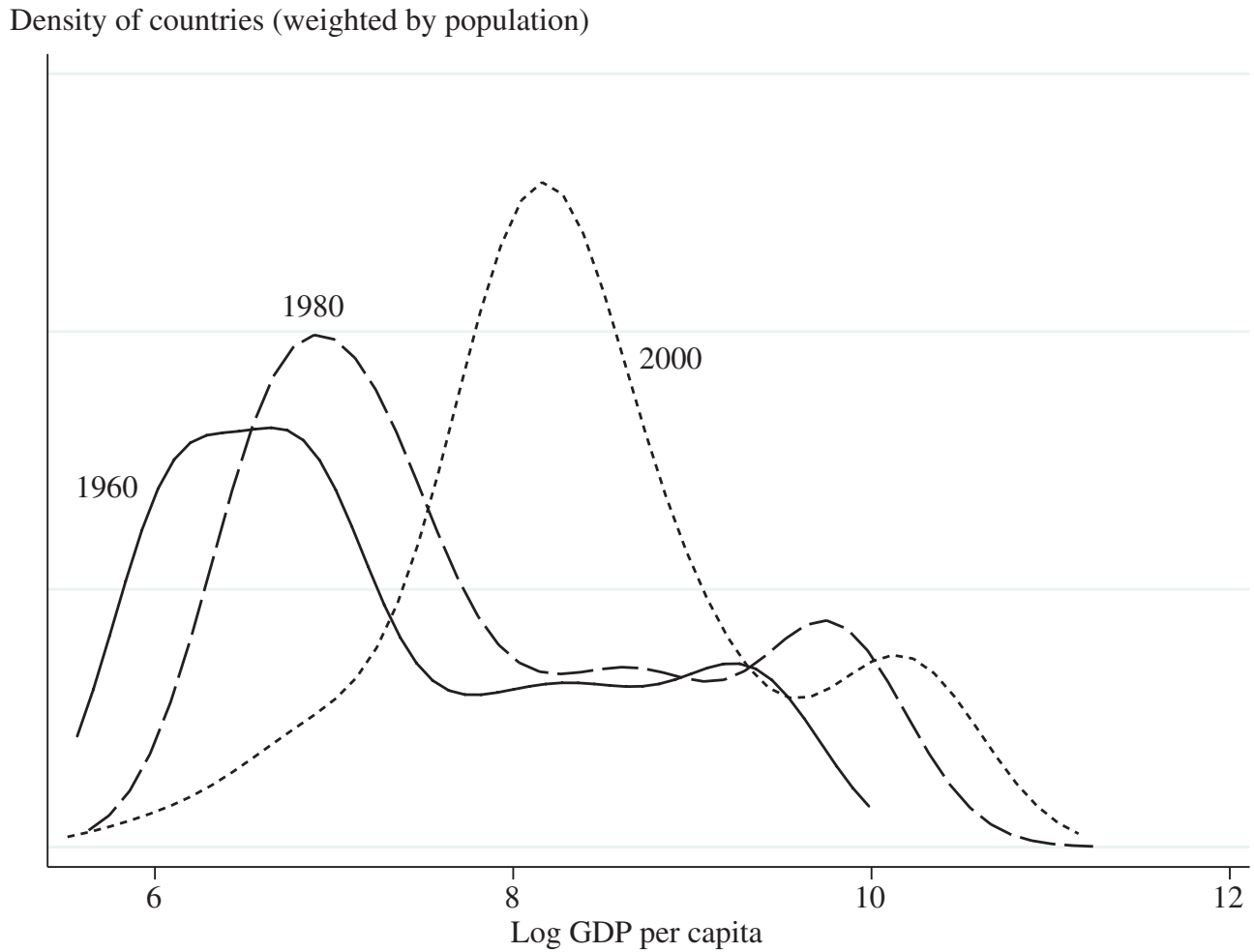

FIGURE 1.3 Estimates of the population-weighted distribution of countries according to log GDP per capita (PPP adjusted) in 1960, 1980, and 2000.

Why should we care about GDPpc levels?

- Higher GDP per capita is positively correlated to
  - consumption (proxy for living standards)
  - life expectancy (health)

Income and Welfare

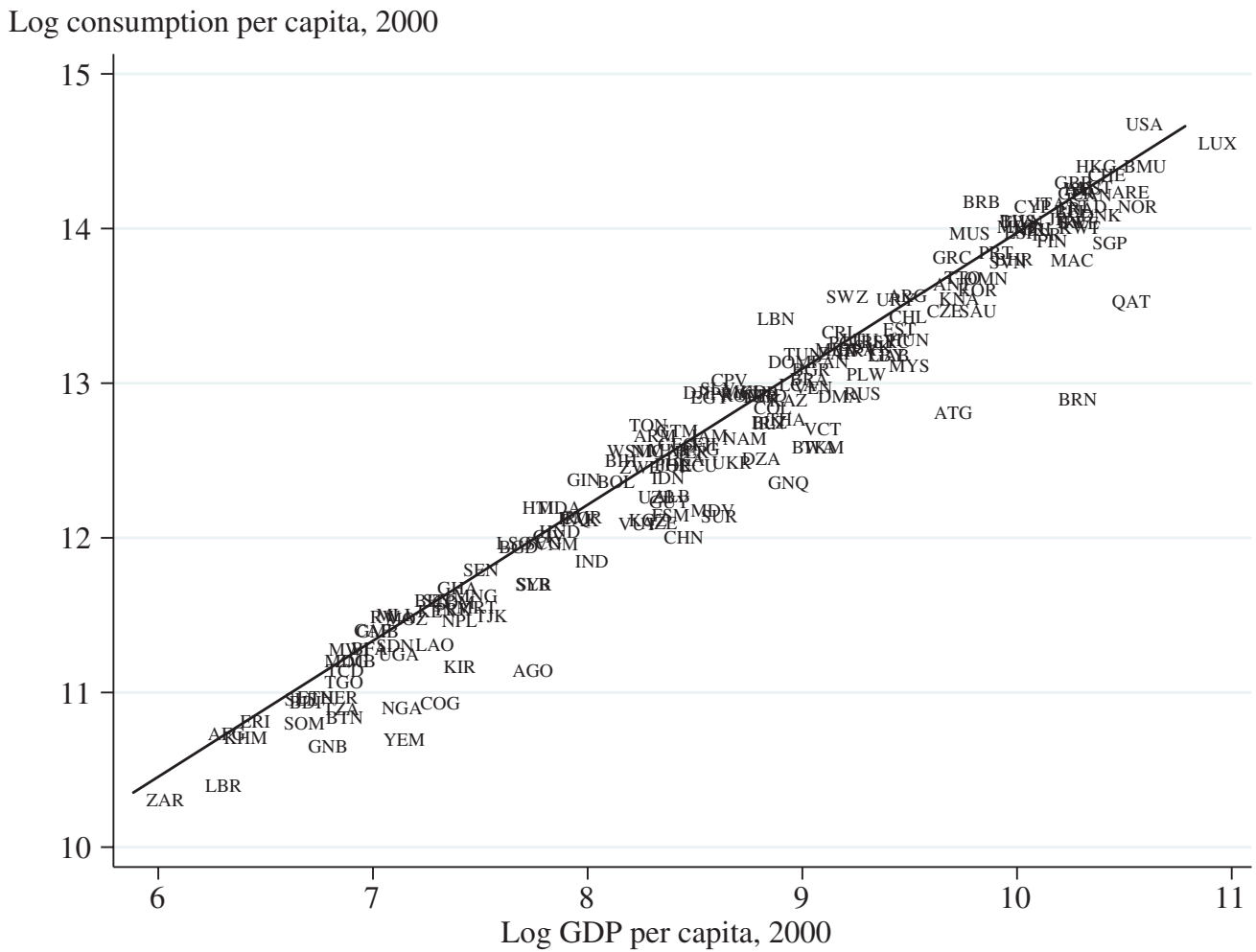

FIGURE 1.5 The association between income per capita and consumption per capita in 2000. For a definition of the abbreviations used in this and similar figures in the book, see http://unstats.un.org/unsd/methods/m49/m49alpha.htm.

Income and Welfare

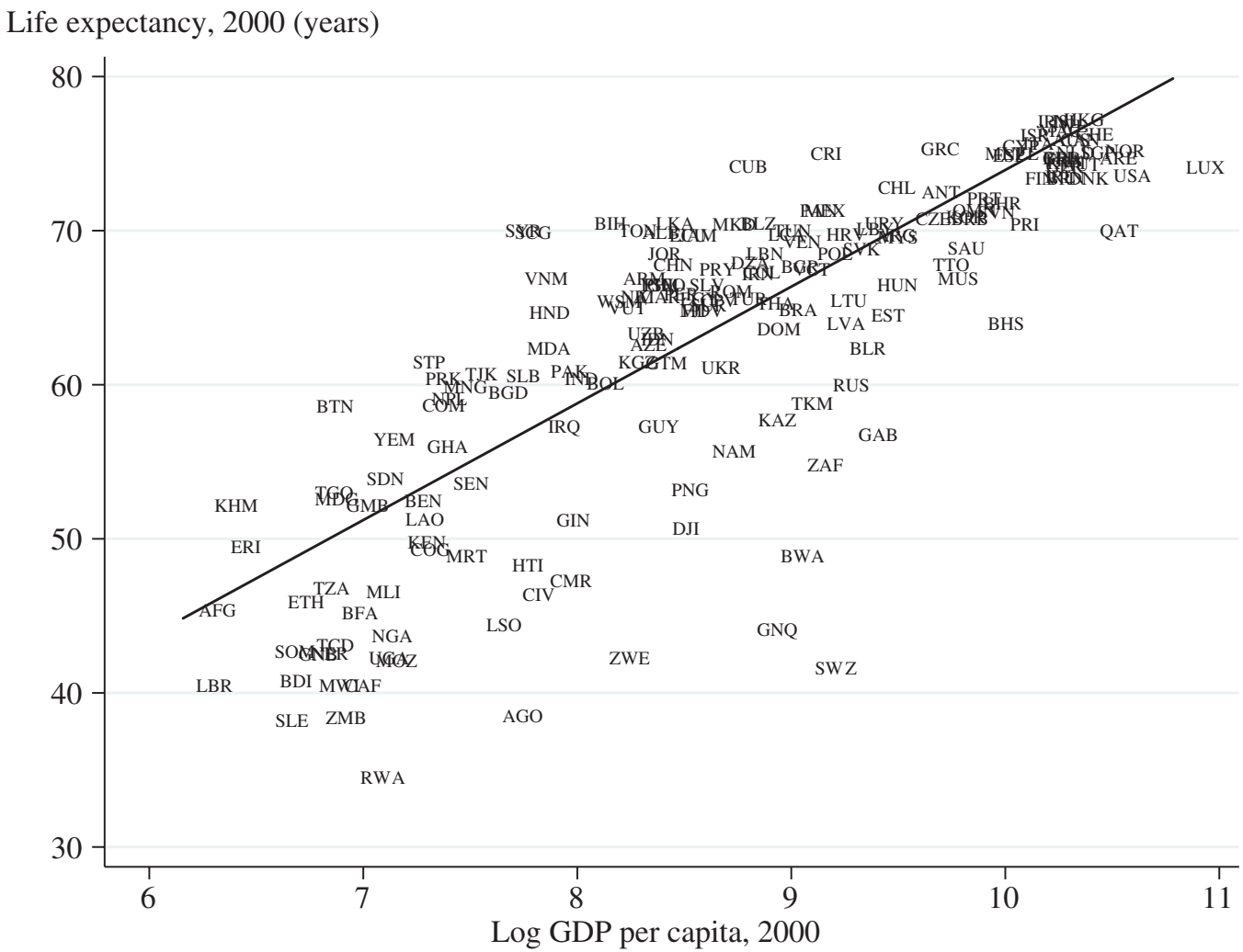

FIGURE 1.6 The association between income per capita and life expectancy at birth in 2000.

Income and welfare

This doesn't mean GDPpc is all we should look at!

- GDPpc is mute about income differences within countries
- growth comes along with change $\rightarrow$ winners and losers

When did differences in GDPpc happened?

The take-off into sustained growth

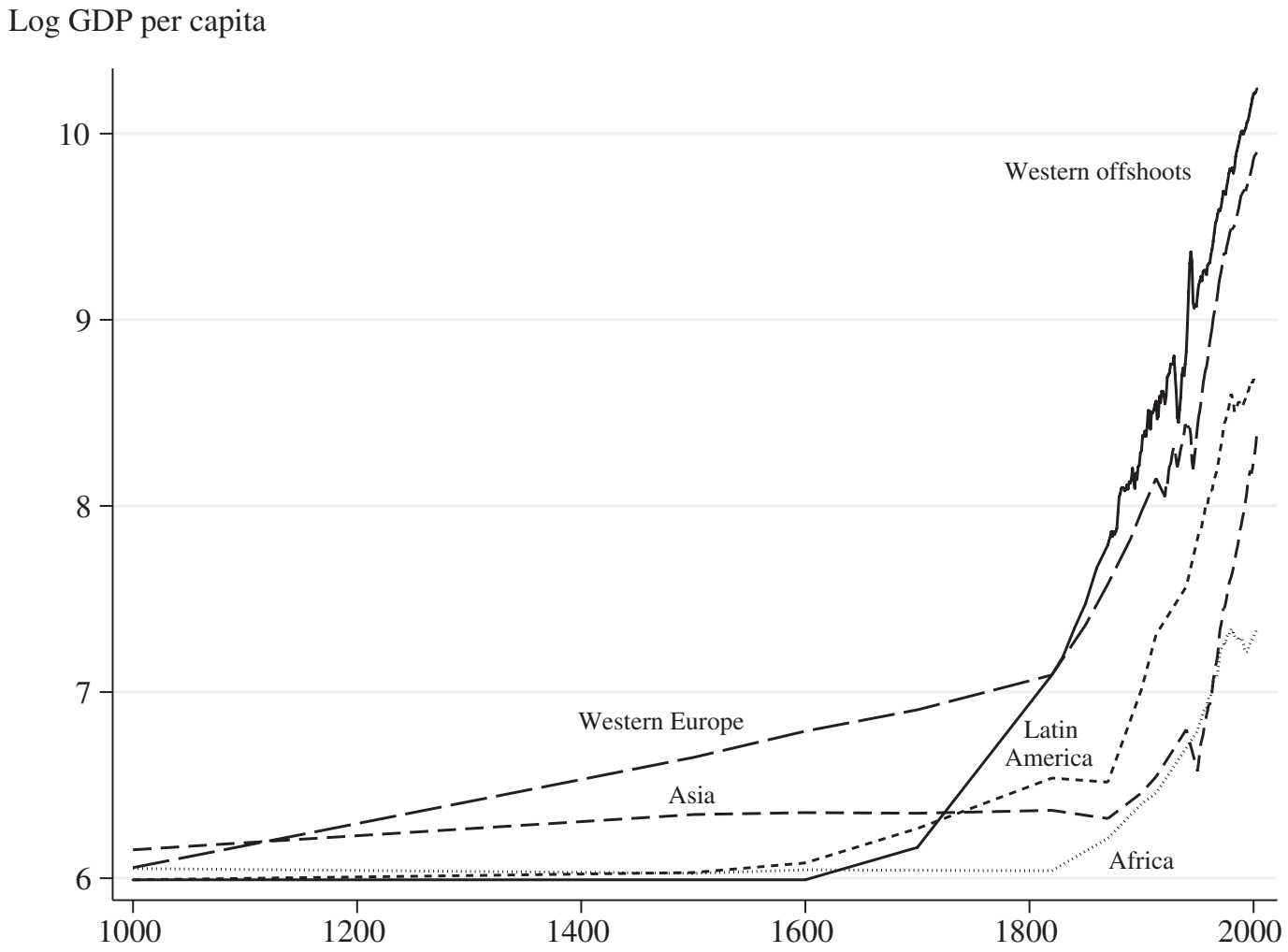

FIGURE 1.11 The evolution of average GDP per capita in Western offshoots, Western Europe, Latin America, Asia, and Africa, 1000–2000.

Convergence

Do we see *unconditional* convergence?

- i.e. do economies tend to close their income gap?
  - No! The ranking of countries is quite stable, at least in the postwar period.
  - Growth is not correlated to initial GDPpc levels.

Convergence

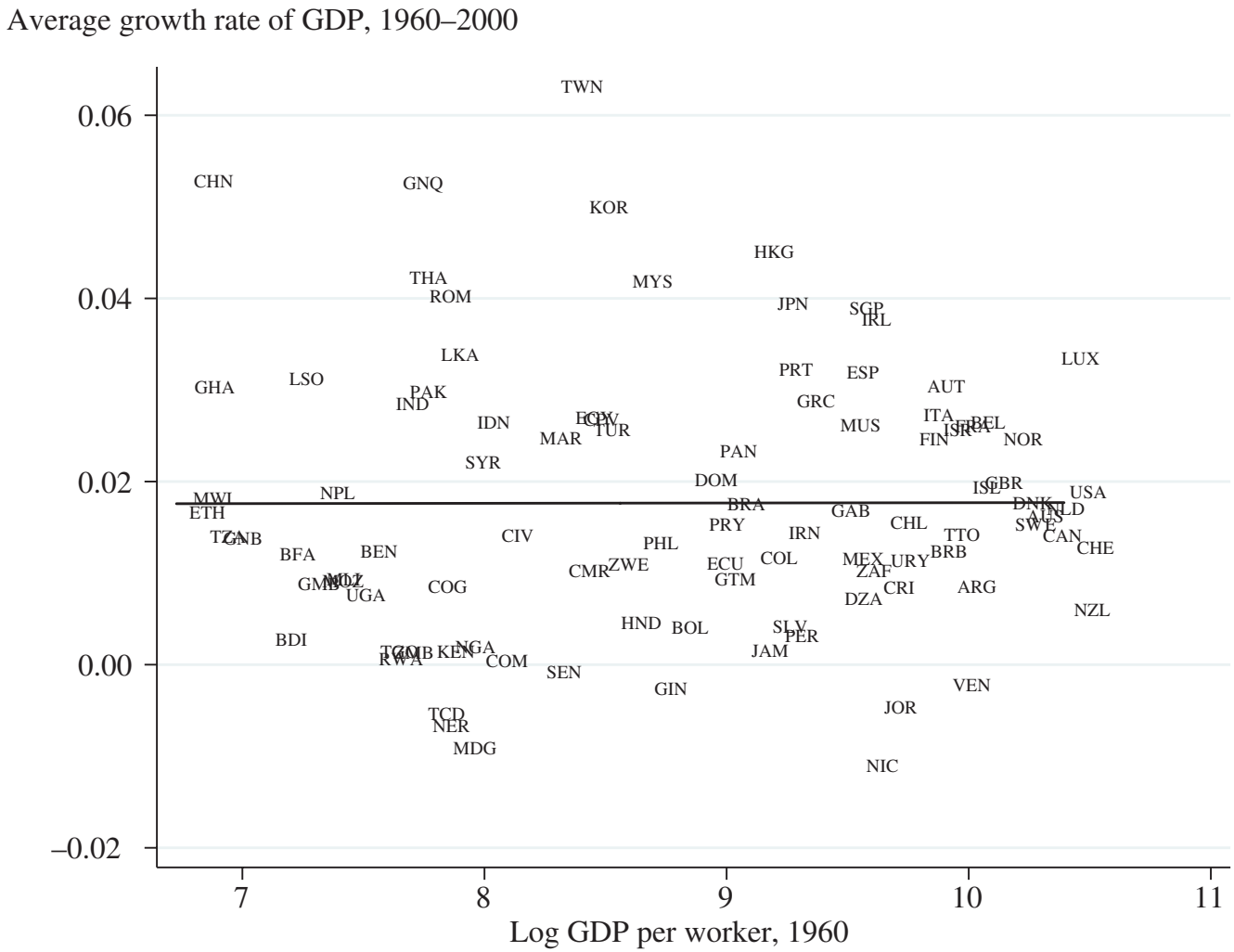

FIGURE 1.13 Annual growth rate of GDP per worker between 1960 and 2000 versus log GDP per worker in 1960 for the entire world.

Convergence

Do we see conditional convergence?

- i.e. do economies that share common features tend to close their income gap?
  - To answer this we need to estimate typical Barro growth regressions as:

$$g_{i,t,t-1} = \alpha \log y_{i,t-1} + X_{i,t-1}^{T} \beta + \epsilon_{i,t}$$

  - i.e. we control for country characteristics
  - doing this, Barro and Sala-i-Martin estimate an $\alpha = -0.2$ for post-war period

Convergence

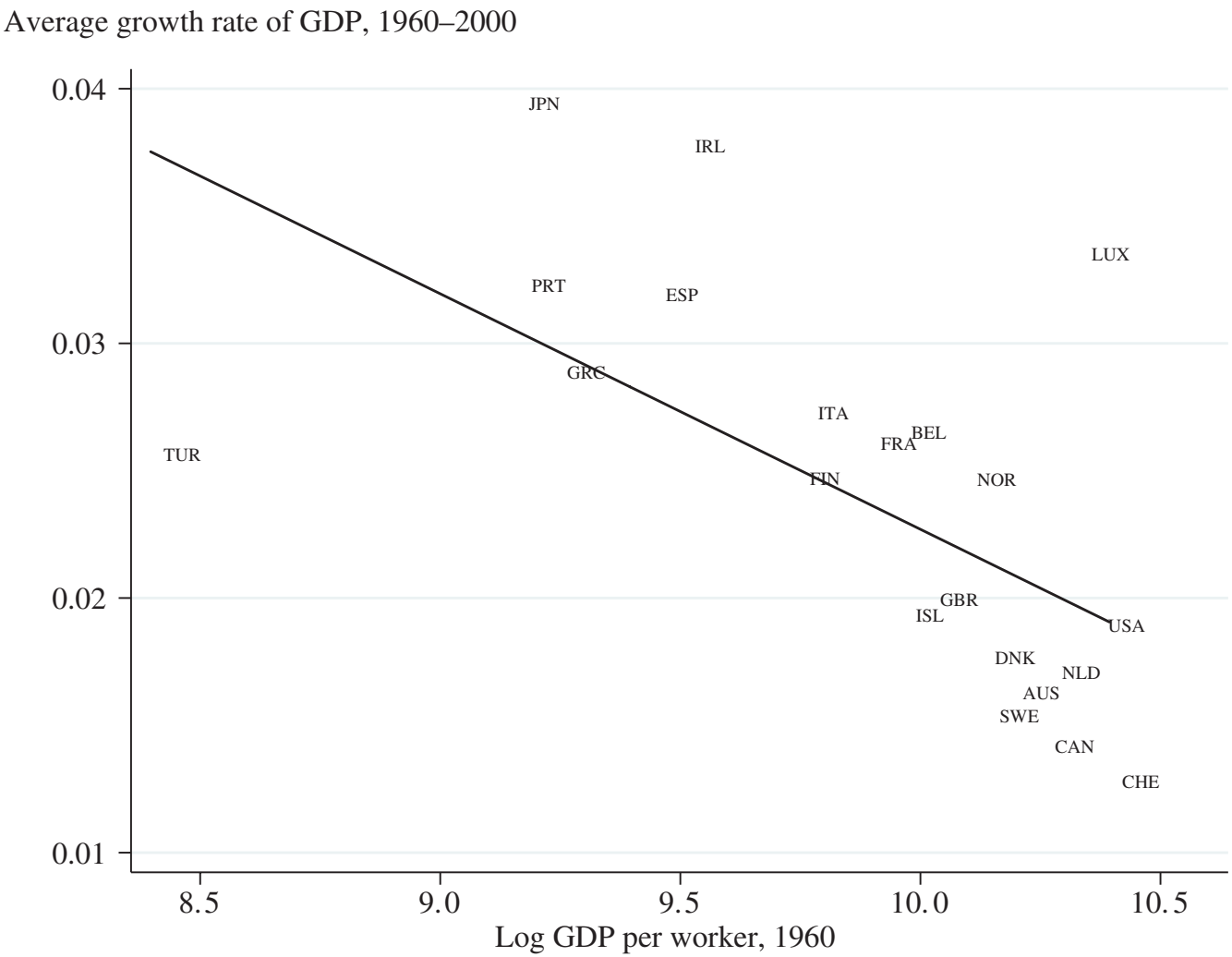

FIGURE 1.14 Annual growth rate of GDP per worker between 1960 and 2000 versus log GDP per worker in 1960 for core OECD countries.

Convergence in the theory

- Throughout this course we will see that many growth models, including the basic Solow and the neoclassical growth models, suggest that there should be transitional dynamics as economies below their steady-state (target) level of income per capita grow toward that level.
- this type of transitional dynamics are compatible with conditional convergence.

Correlates to growth

- Investment in physical capital
- Investment in human capital

Correlates to growth

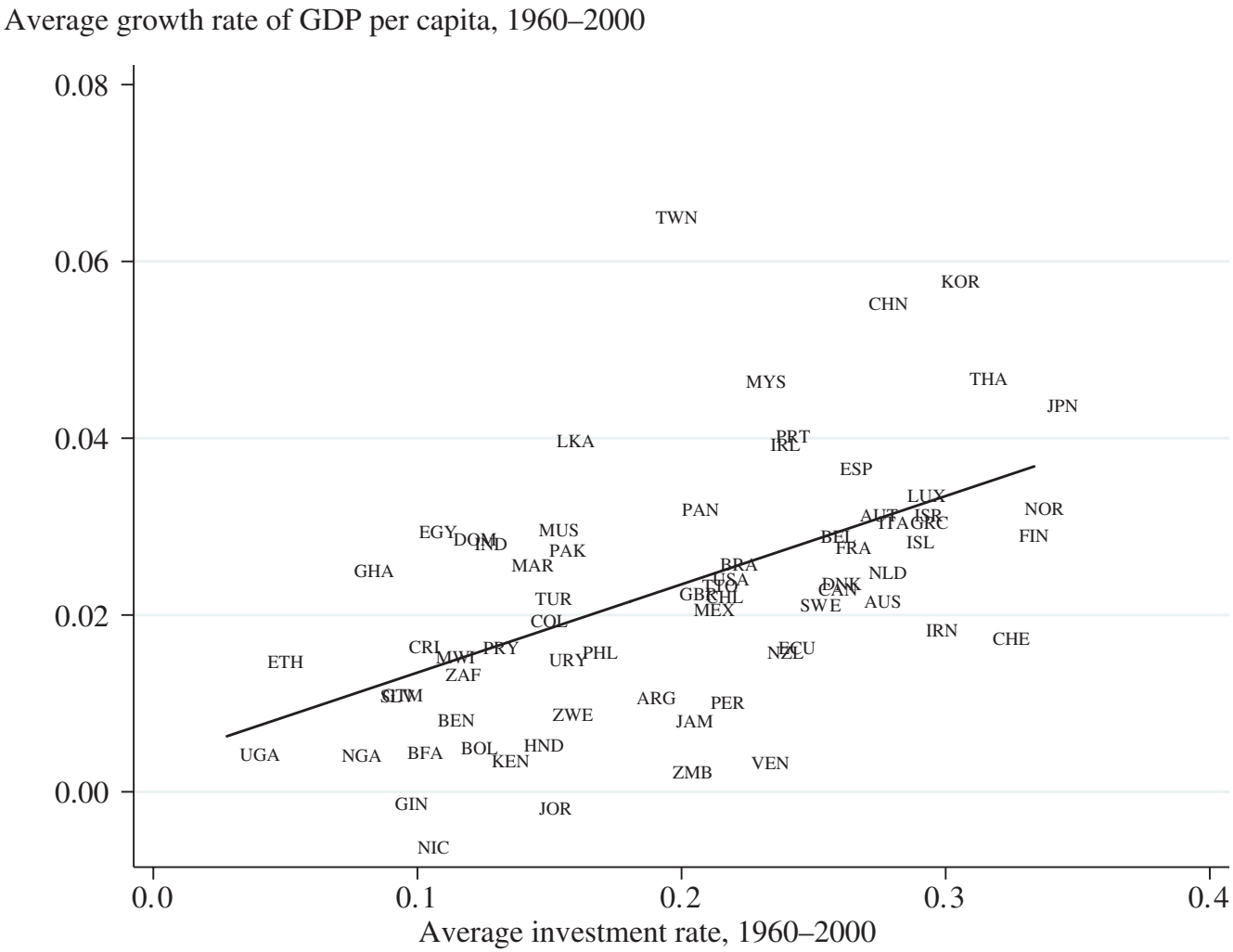

FIGURE 1.15 The relationship between average growth of GDP per capita and average growth of investments to GDP ratio, 1960–2000.

Correlates to growth

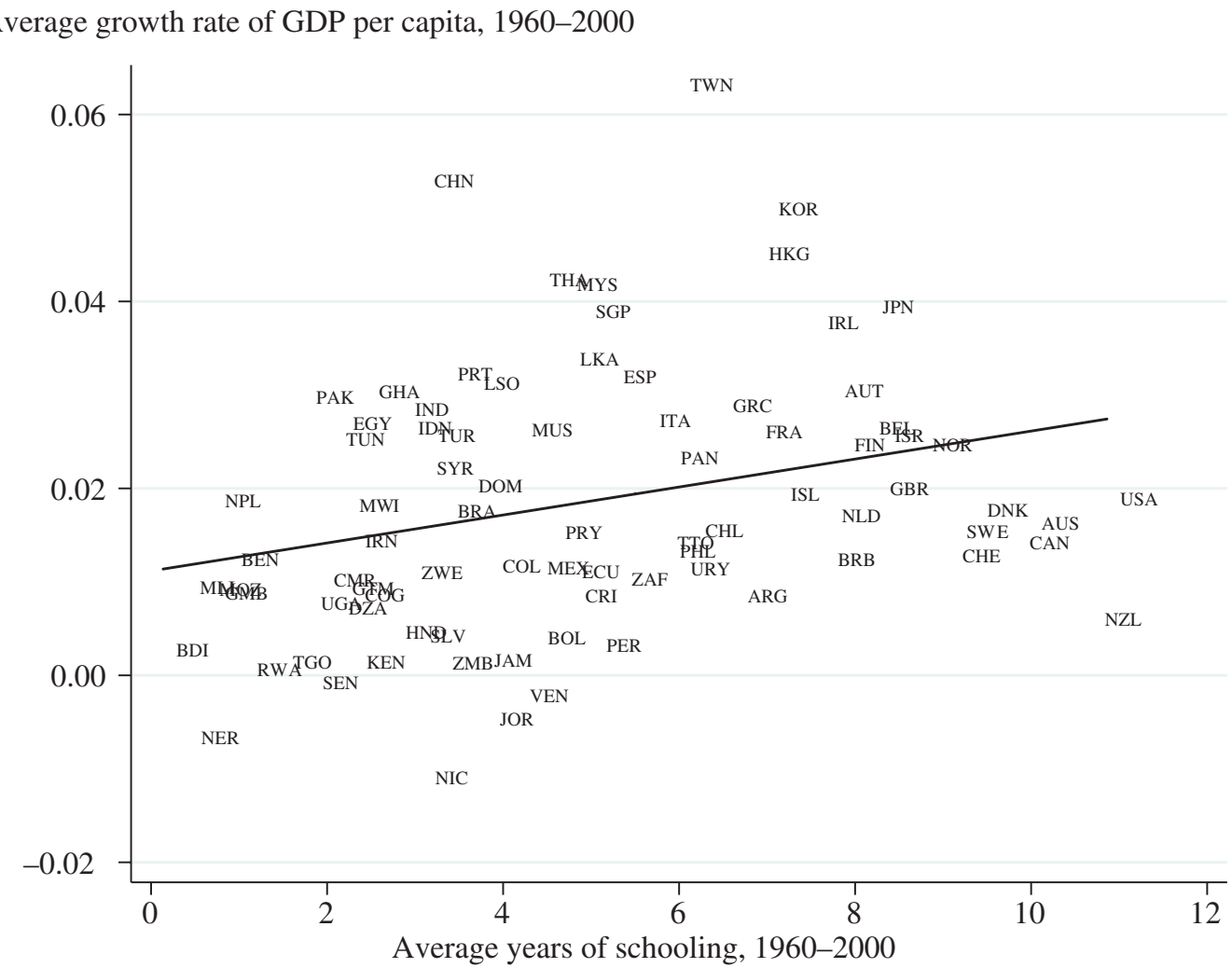

FIGURE 1.16 The relationship between average growth of GDP per capita and average years of schooling, 1960–2000.

Correlates to growth

Are these relationships causal?

- We can't say with the evidence presented so far
- There could be omitted variables affecting both the investment vars and growth.

Besides accumulating factors, how these are used (*efficiency*) also matters!

- *technology* is also important!

Countries show uneven success in acquiring factors and achieving efficiency. But, why?

Correlates to growth

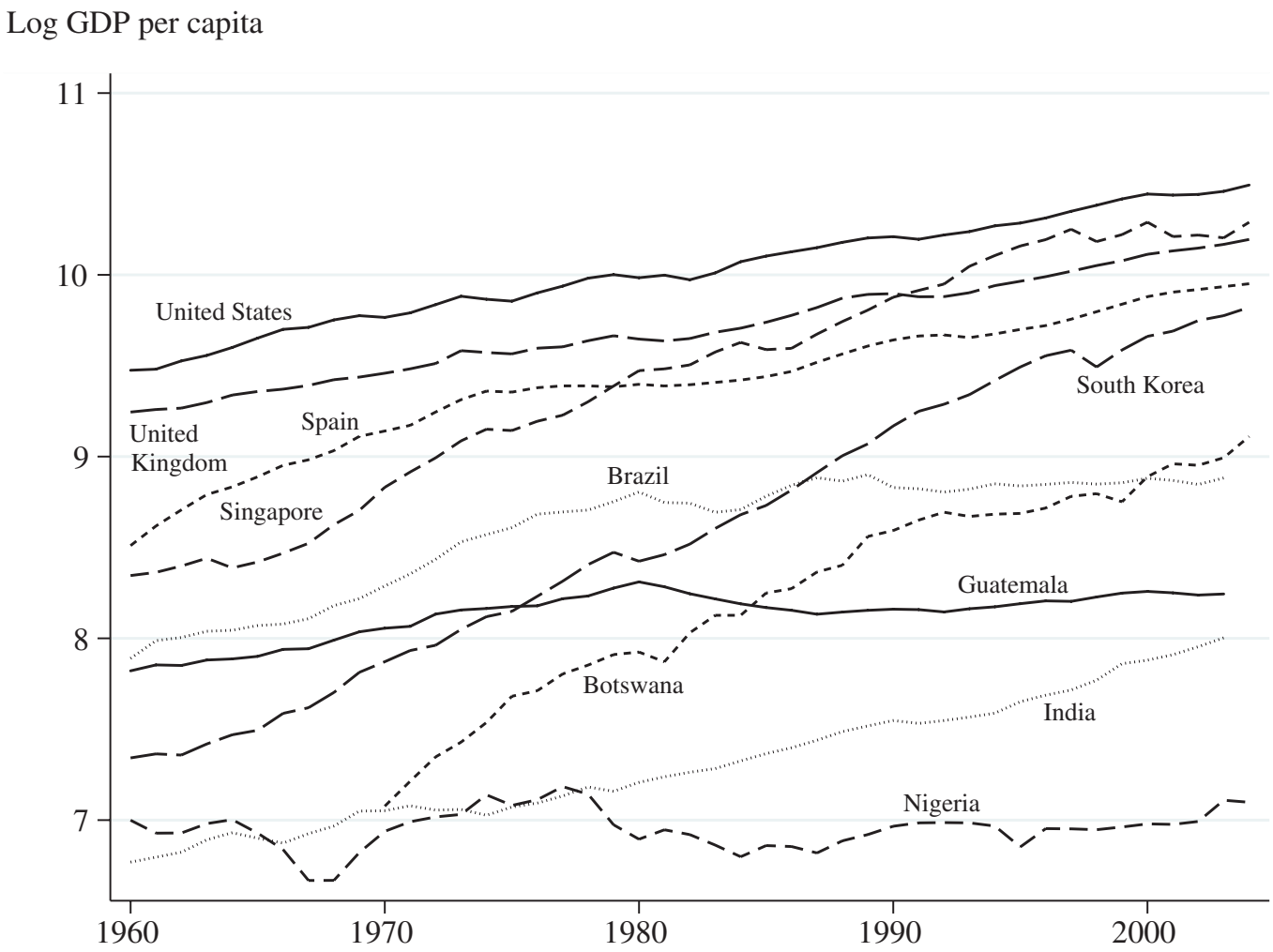

FIGURE 1.8 The evolution of income per capita in the United States, the United Kingdom, Spain, Singapore, Brazil, Guatemala, South Korea, Botswana, Nigeria, and India, 1960–2000.

Deep fundamental causes of growth

- luck (or multiple equilibria)
- geography
- institutions (and policies)
- culture