EC569 Economic Growth
Introduction
Lecture 1

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University of Kent

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EC569 Economic Growth

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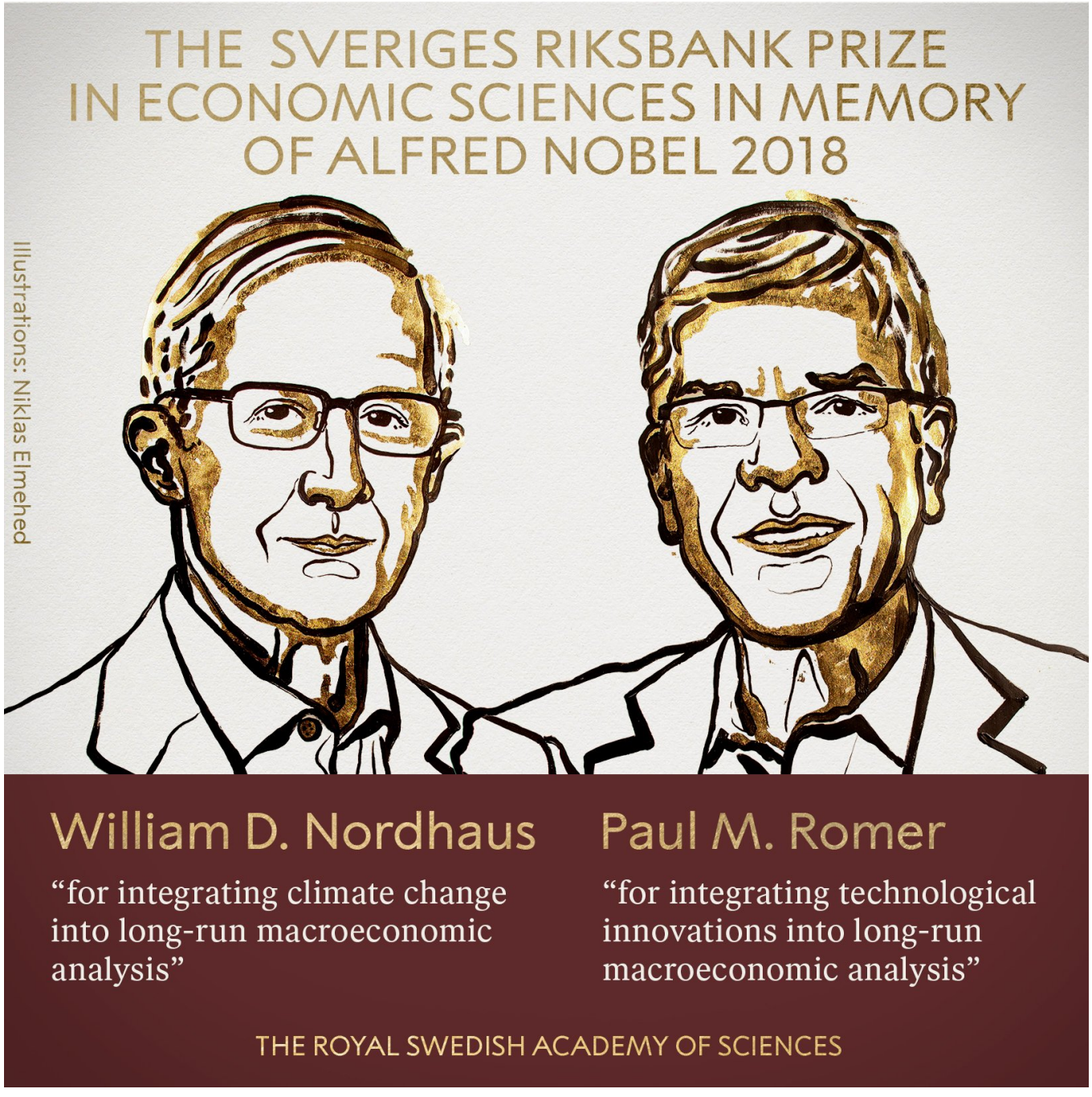
Topics

- Facts and modern theories of economic growth
- The role of productivity on growth
- The relationship between government policies, income inequality and economic growth

Questions

- Why do countries differ in their standards of living?
- Why do countries grow richer or fail to grow richer over time?
- What are the roles of physical capital, population, human capital, fertility, ideas, basic science, and public policy for growth?


THE SVERIGES RIKSBANK PRIZE
IN ECONOMIC SCIENCES IN MEMORY
OF ALFRED NOBEL 2018
Illustrations: Niklas Elmehed
William D. Nordhaus
“for integrating climate change into long-run macroeconomic analysis”
Paul M. Romer
“for integrating technological innovations into long-run macroeconomic analysis”
THE ROYAL SWEDISH ACADEMY OF SCIENCES

Timetable

- Lectures: Weeks 13-24, Mondays 14:00 - 15:00
- Seminars: Weeks 16-18, 20-22

Assessment

- Coursework: 20%
  - 3 Problem Sets (10% total)
    - Problem Set 1: Assigned Week 14; Moodle quiz Week 15
    - Problem Set 2: Assigned Week 18; Moodle quiz Week 19
    - Problem Set 3: Assigned Week 20; Moodle quiz Week 21
  - Essay (10 %)
    - Due 12pm Monday of Week 24 (Turnitin)
- Exam: 80%
  - Exam format will be different than last year's format.
  - A mock exam will be posted soon.

Assessment of problem sets

- Problem sets will be assessed using Moodle quizzes.
- On the due weeks of problem sets, quizzes will appear on Moodle for 48 hours from Monday 4pm to Wednesday 4pm.
- To take a quiz, first,
  you must submit your work on the problem set in digital form
  (typed or scanned copy of your hand-written solution).
- Each problem set quiz will be
  on the questions of the problem set.
- You will have 2 hours to complete the quiz once started.
- You will have 1 attempt.
- A mock problem set (#0) is up on Moodle today. Quiz will appear on Moodle next week.

Textbook

- Weil, D., 2013, Economic Growth, 3rd ed., **must read**
- Jones, C. and D. Vollrath, 2013, Introduction to Economic Growth, 3rd ed., **must read**

Seminars

- Questions will be available on Moodle before seminars
  - Data analysis
  - Reading questions
  - Problems
- Everyone is responsible for reading the material and answering the questions.

Readings

- Mandatory papers/articles are marked with (*) on the Module outline.
- There will be exam questions on them.

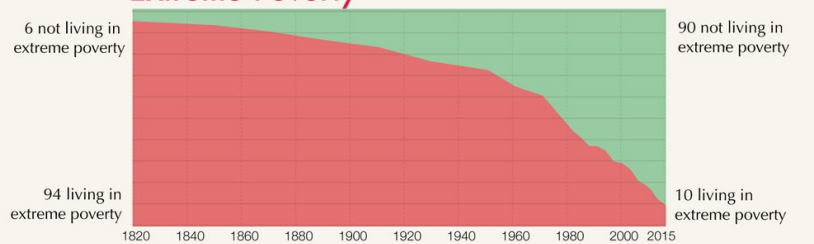
Other resources

- `https://ourworldindata.org`
- Rosling, H., Rosling, O., & Rönnlund, A. R. (2018). Factfulness: Ten Reasons We're Wrong about the World–and why Things are Better Than You Think. St Martin's Press.
- `https://voxeu.org`
- `https://growthecon.com/blog/`
- `https://gunerilhan.github.io/teaching/`

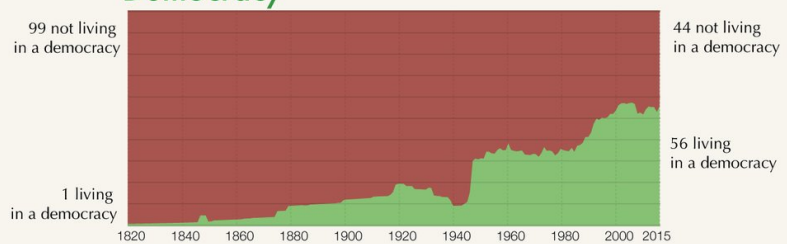
The World as 100 People
over the last two centuries

Our World in Data

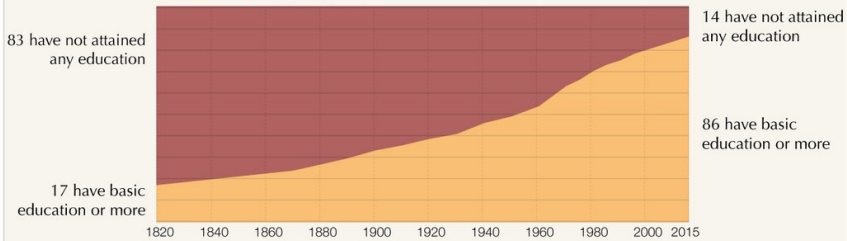
Extreme Poverty



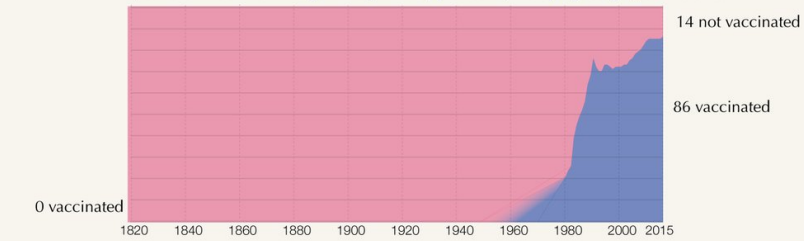
Democracy



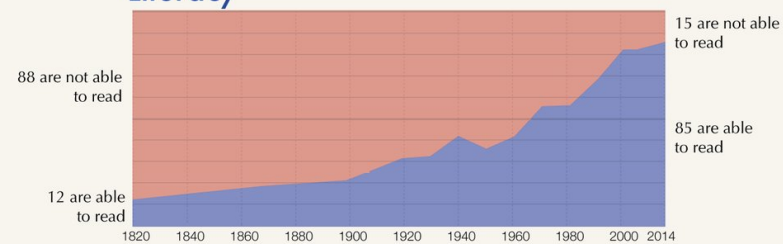
Basic Education



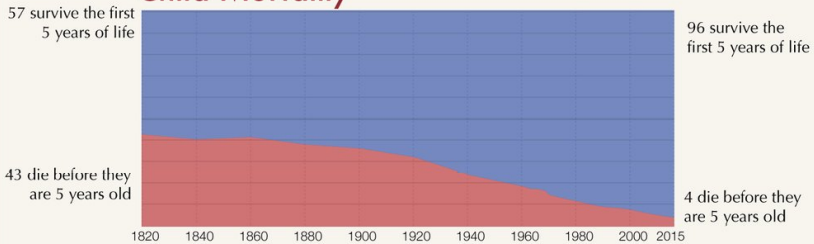
Vaccination against diphtheria, pertussis (whooping cough), and tetanus



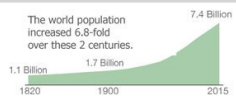
Literacy



Child Mortality



Data sources:
Extreme Poverty: Bourguignon & Morrison (2002) up to 1970 – World Bank 1981 and later (2015 is a projection).
Vaccination: WHO (Global data are available for 1980 to 2015 – the DPT3 vaccination was licenced in 1949)
Education: OECD for the period 1820 to 1960. IIASA for the time thereafter.
Literacy: OECD for the period 1820 to 1990. UNESCO for 2004 and later.
Democracy: Politiy IV index (own calcluation of global population share)
Colonialism: Wimmar and Min (own calcluation of global population share)
Continent: HYDE database
Child mortality: up to 1960 own caluclations based on Gapminder; World Bank thereafter



All these visualizations are from OurWorldInData.org an online publication that presents the empirical evidence on how the world is changing.

ask for specific feedback

Julia Evans
@b0rk

I used to ask for feedback like this:

I've learned that I get ★WAY BETTER★ answers if I ask more specific questions!

When I ask ★specific★ questions, it's way easier for my manager to give me answers that help me improve ♥

Read the Module Outline

Structure of the Module

- Broad empirical regularities
- Theories to account for these regularities
- Testing of the predictions of the theories

Gross Domestic Product (GDP)

GDP: Market value of all the goods and services produced in a country within a period.

- GDP = output = income
- GDP is a rough-and-ready measure of standard of living.
- How to compare GDP of countries with different currencies and of a single country in different years?
- **Purchasing Power Parity (PPP) exchange rates:** artificial exchange rates based on the prices of a standardized basket of goods and services (both traded and non-traded).

GDP per capita

GDP per capita = average income

$$y_t = \frac{\text{total GDP}}{\text{population}}$$

- Total GDP could be large because of high average income and/or large population
- US has high GDP per capita but China and India do not

Facts to be explained

Fact #1

- **Fact #1**: There is high variation in per capita income across countries.
- Per capita income in the poorest countries are less 5% of per capita income in the richest countries.
- GDP per capita in 2009 (in 2005 dollars)

$$\frac{\text{US (\$41709)}}{\text{Iran (\$10624)}} \approx \frac{\text{Iran (\$10624)}}{\text{Moldova (\$2493)}} \approx \frac{\text{Moldova (\$2493)}}{\text{Ethiopia (\$684)}} \approx 4$$

- The 20% of world population that lives in the richest countries receive 60% of world income.

Rich Countries

Country	GDP per capita 2008	GDP per worker 2008	LF Part. Rate 2008	Avg. Growth 1960-2008	Years to Double
United States	$43,326	$84,771	0.51	1.6	43
Japan	33,735	64,778	0.52	3.4	21
France	31,980	69,910	0.46	2.2	30
United Kingdom	35,345	70,008	0.51	1.9	36
Spain	28,958	57,786	0.50	2.7	26

Data source: Summers and Heston (1991)
Table from: Jones and Vollrath (2013)
The GDP data are in 2005 dollars.

Poor Countries

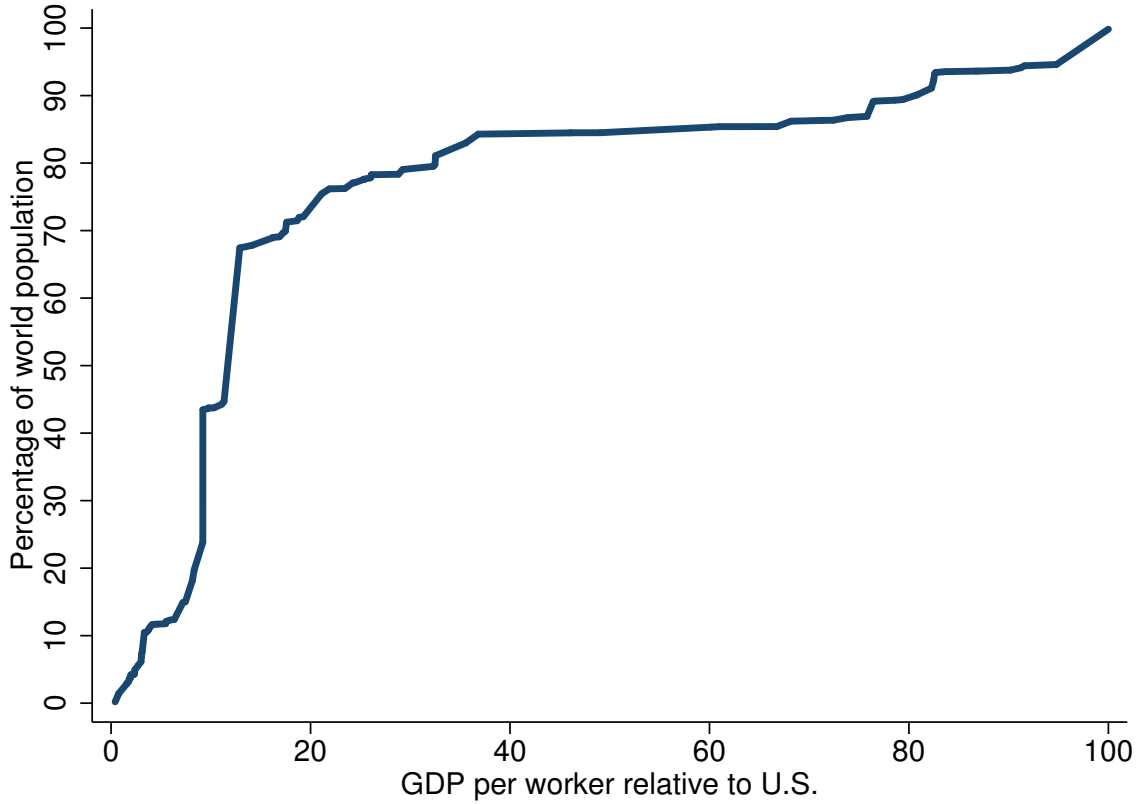
Country	GDP per capita 2008	GDP per worker 2008	LF Part. Rate 2008	Avg. Growth 1960-2008	Years to Double
China	6,415	10,938	0.59	5.6	13
India	3,078	7,801	0.39	3.0	24
Nigeria	1,963	6,106	0.32	0.6	114
Uganda	1,122	2,604	0.43	1.3	52

Data source: Summers and Heston (1991)

Table from: Jones and Vollrath (2013)

The GDP data are in 2005 dollars.

Distribution of Population by GDP per Worker, 2008



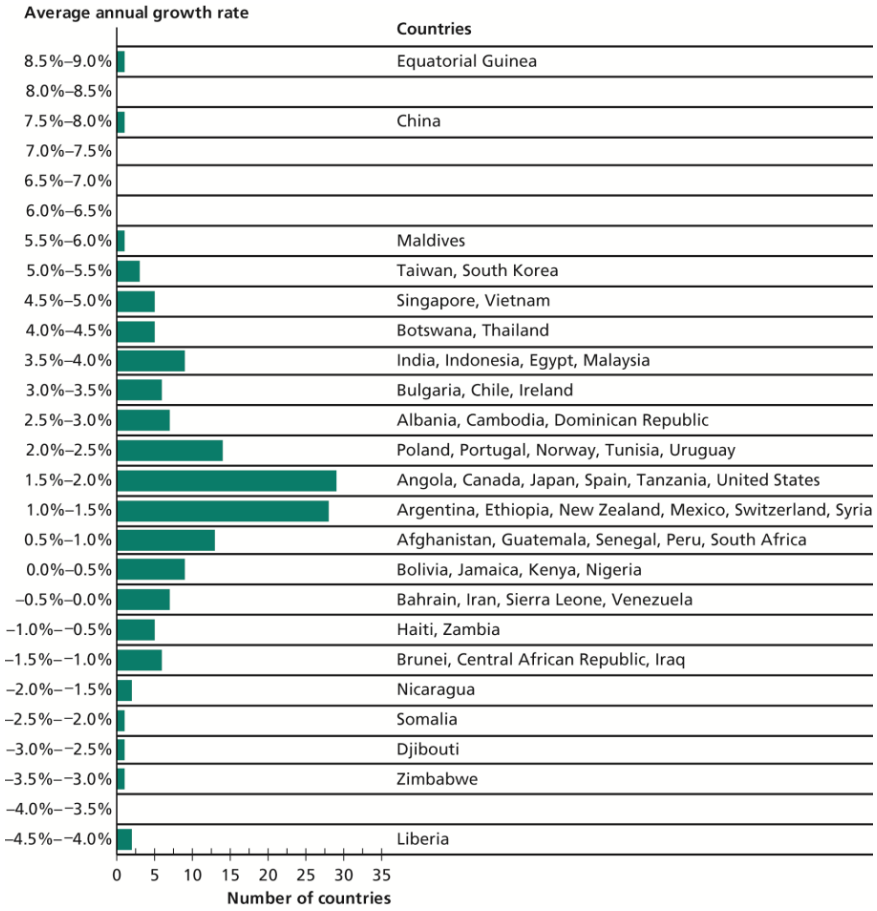
Data source: Summers and Heston (1991)

Table from: Jones and Vollrath (2013)

Fact #2

- **Fact #2:** There is substantial variation in rates of economic growth rates across countries.

Distribution of rates of economic growth, 1975-2009



Source: Heston, Summers, and Aten (2011).

Graphic from: Weil (2013)

Distribution of growth rates

Over 1975-2009

- world average growth rate $= 3\%$
- wide variance in growth rates
  - growth miracles: China, Equatorial Guinea
  - growth disasters: Democratic Republic of Congo, Liberia

Growth Miracles

Country	GDP per capita 2008	GDP per worker 2008	LF Part. Rate 2008	Avg. Growth 1960-2008	Years to Double
Hong Kong	37,834	70,940	0.53	4.3	16
Singapore	49,987	92,634	0.54	4.1	17
Taiwan	29,645	62,610	0.47	5.1	14
South Korea	25,539	50,988	0.50	4.5	16

Data source: Summers and Heston (1991)

Table from: Jones and Vollrath (2013)

Growth Disasters

Country	GDP per capita 2008	GDP per worker 2008	LF Part. Rate 2008	Avg. Growth 1960-2008	Years to Double
Venezuela	9,762	21,439	0.46	-0.1	-627
Haiti	1,403	3,164	0.44	-0.4	-168
Madagascar	810	1,656	0.49	-0.1	-488
Zimbabwe	135	343	0.40	-1.5	-47

Data source: Summers and Heston (1991)

Table from: Jones and Vollrath (2013)

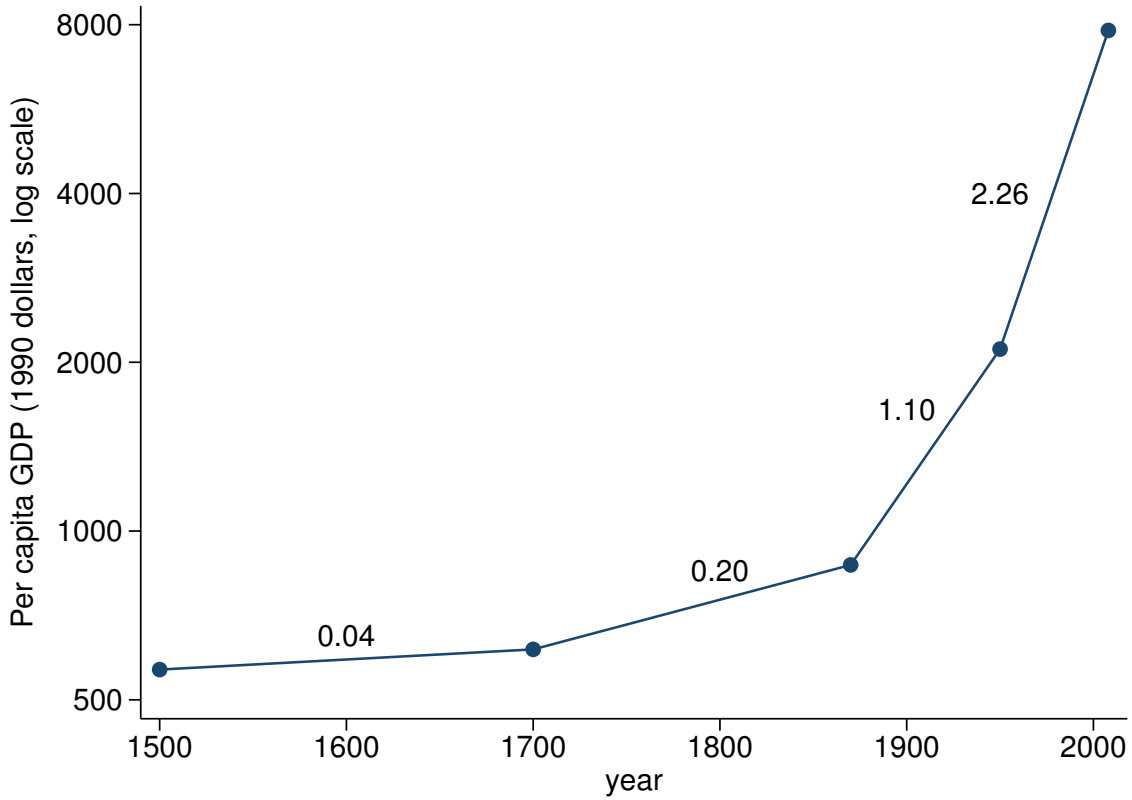
Rule of 72

- x% economic growth rate
- It takes 72/x years to double its income
- E.g.: x = 1.8%, it takes 40 (=72/1.8) years to double income.
- Sometimes 70 is used instead of 72.

Fact #3

- **Fact #3:** Growth rates are not usually constant over time.
- The pace of growth worldwide has accelerated
  - 1500 - 1700: .04%
  - 1700 - 1870: .2%
  - 1870 - 1950: 1.1%
  - 1950 - 2008: 2.26%
- Changes in growth rates of individual countries beginitemize
  - India, 1960-1980: 2%
  - India, 1980-2008: 3.7%
  - China, 1960 - 1978: 2.1%
  - China, 1978 - 2008: $\approx$7.7%

World per capita GDP, and growth rates

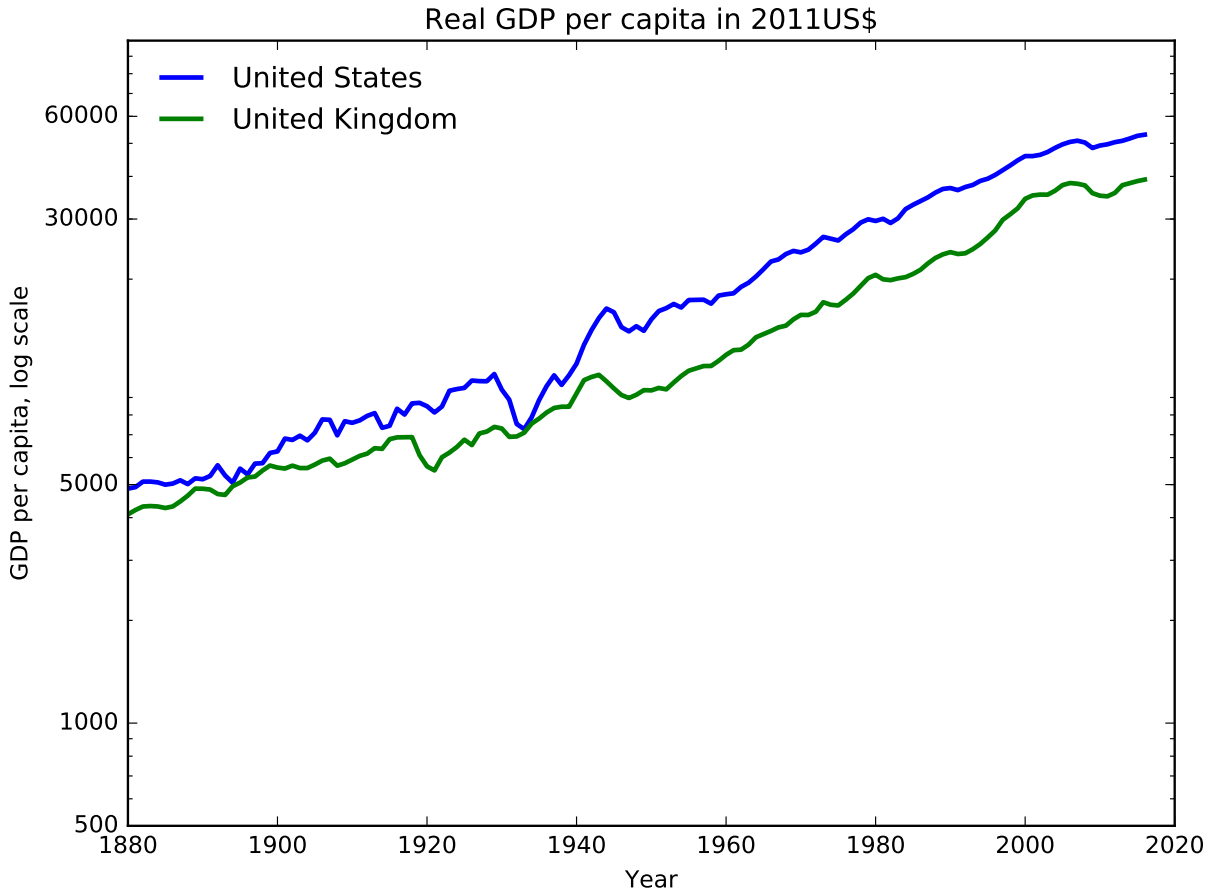


Data source: Maddison (2010)
Table from: Jones and Vollrath (2013)

Fact #4

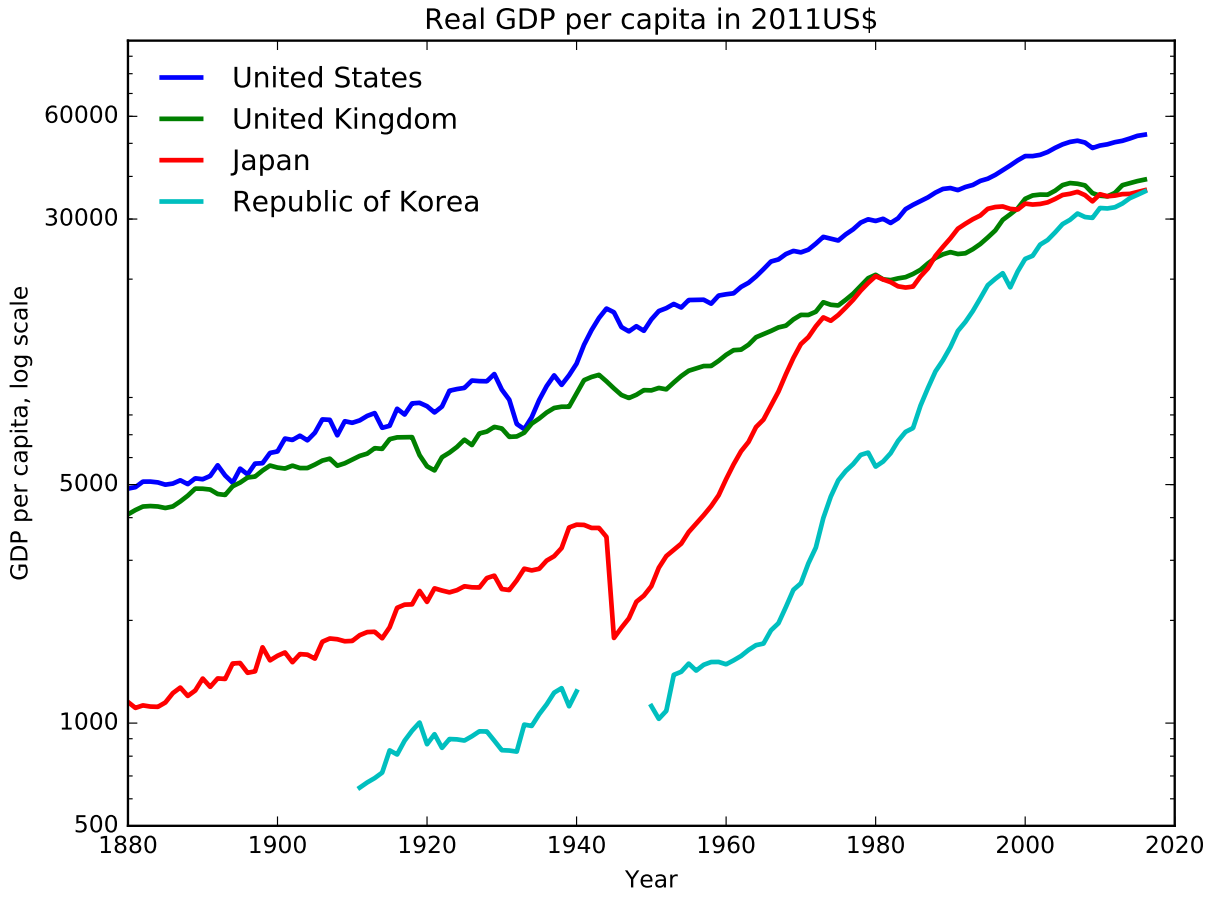
- **Fact #4:** A country's relative position in the relative income rank may change over time.
- "Poor" countries can move to be "rich"
- "Rich" countries can move to be "poor"

Income over time



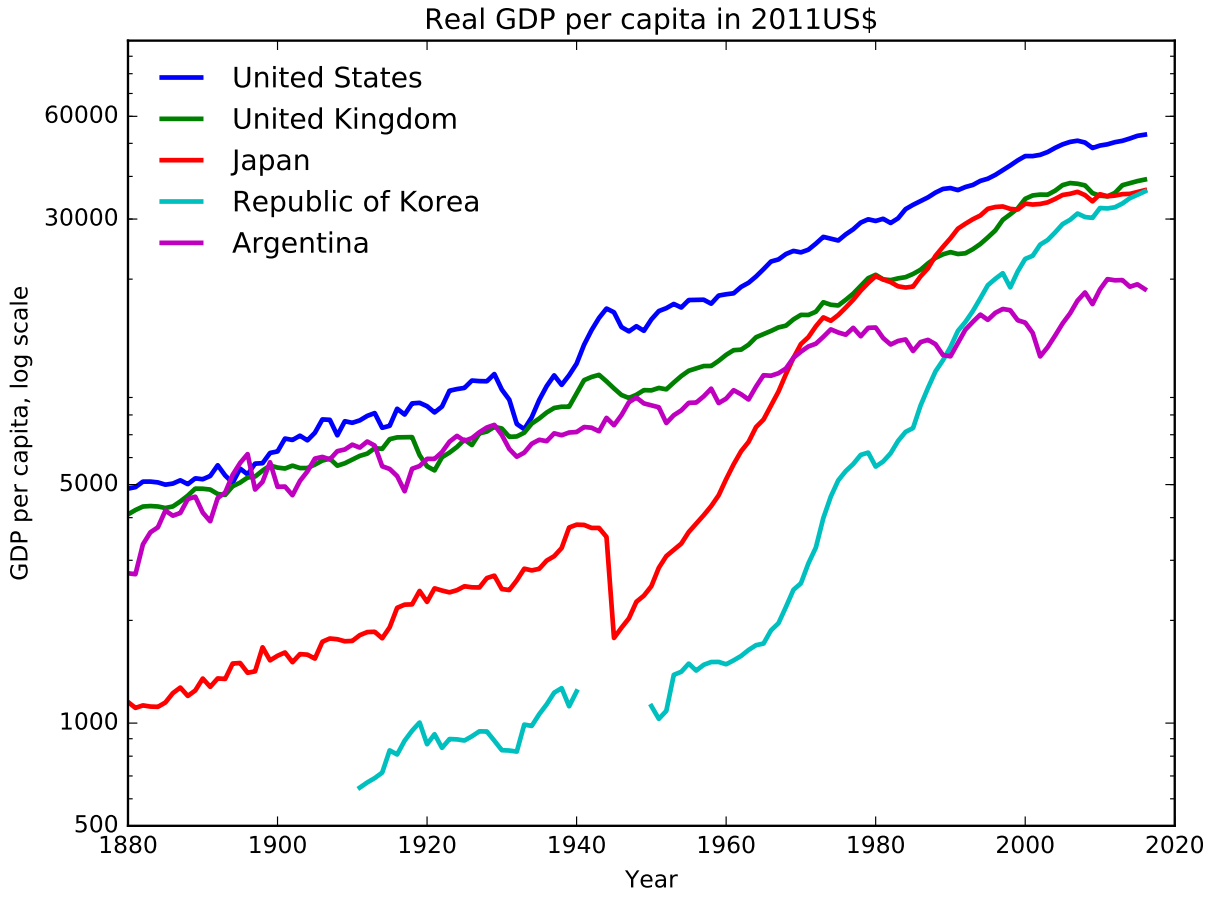
Source: Maddison Project Database, version 2018

Income over time



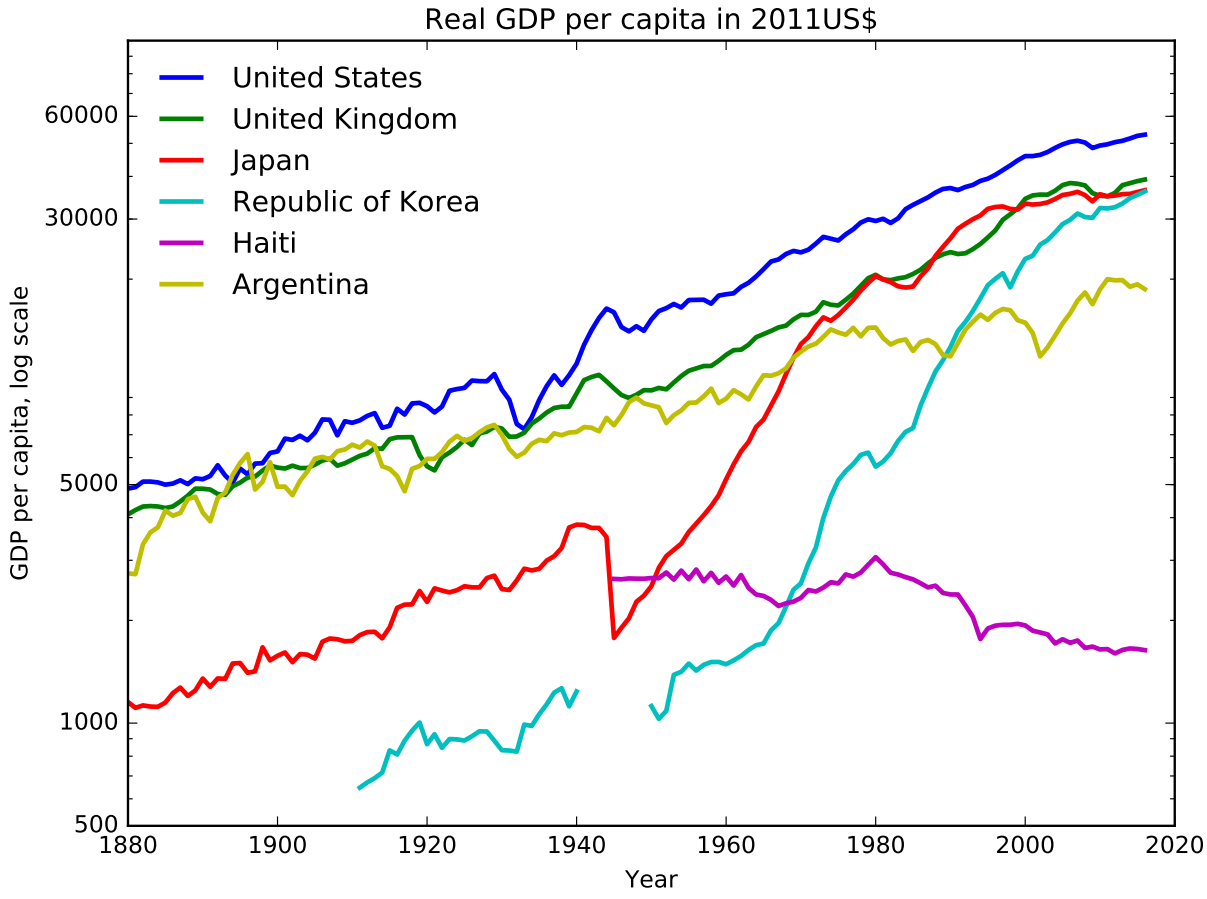
Source: Maddison Project Database, version 2018

Income over time



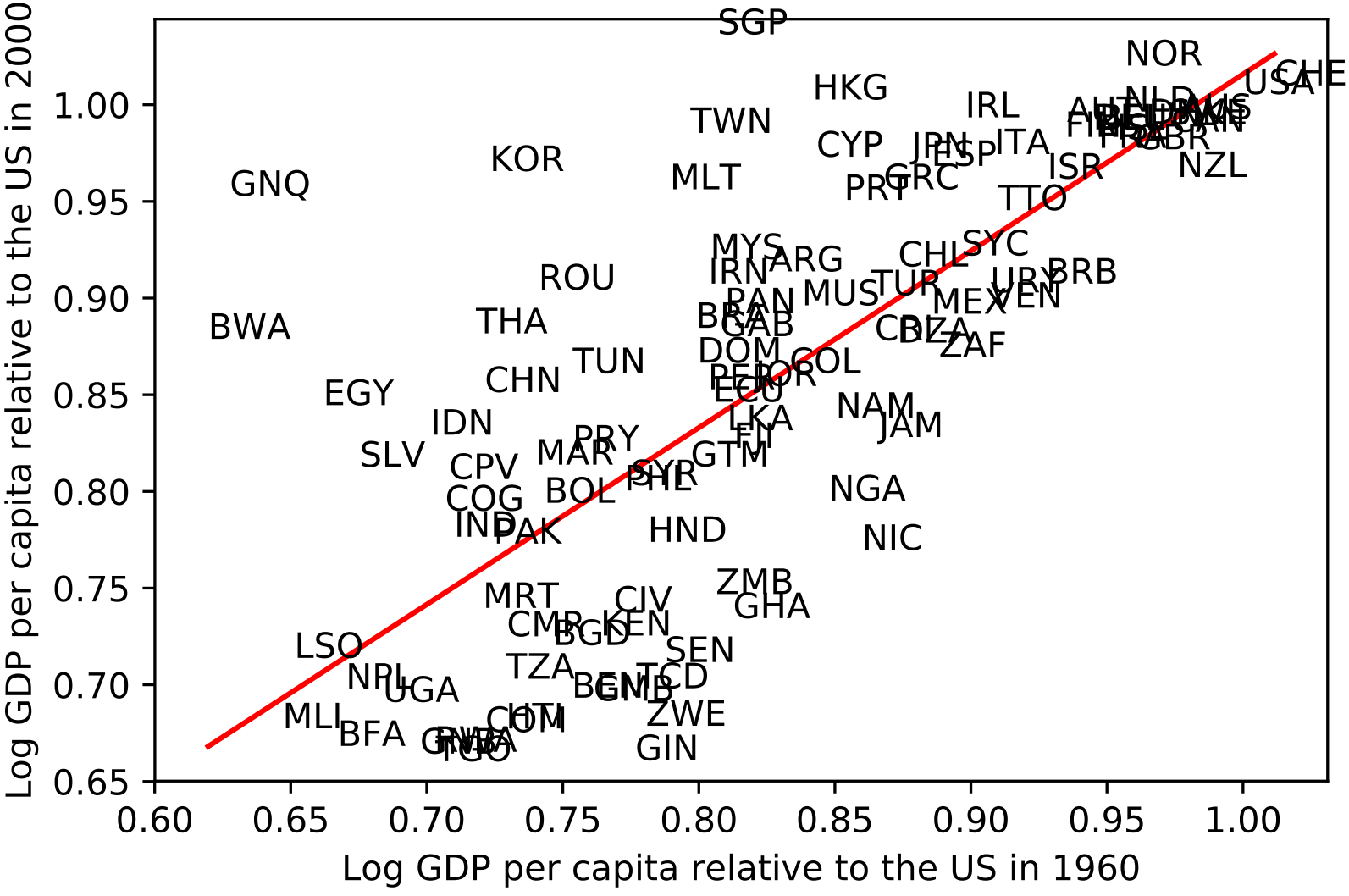
Source: Maddison Project Database, version 2018

Income over time



Source: Maddison Project Database, version 2018

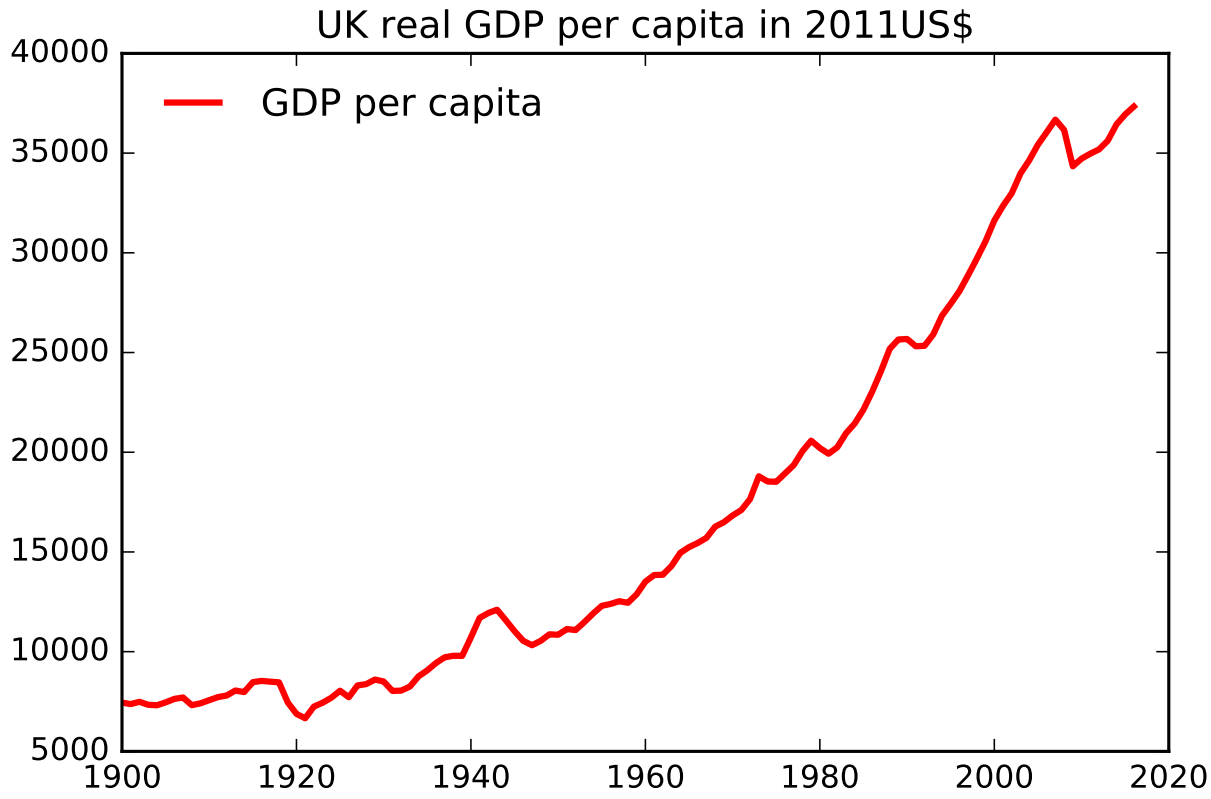
Persistence of income



Importance of small differences in rate of economic growth

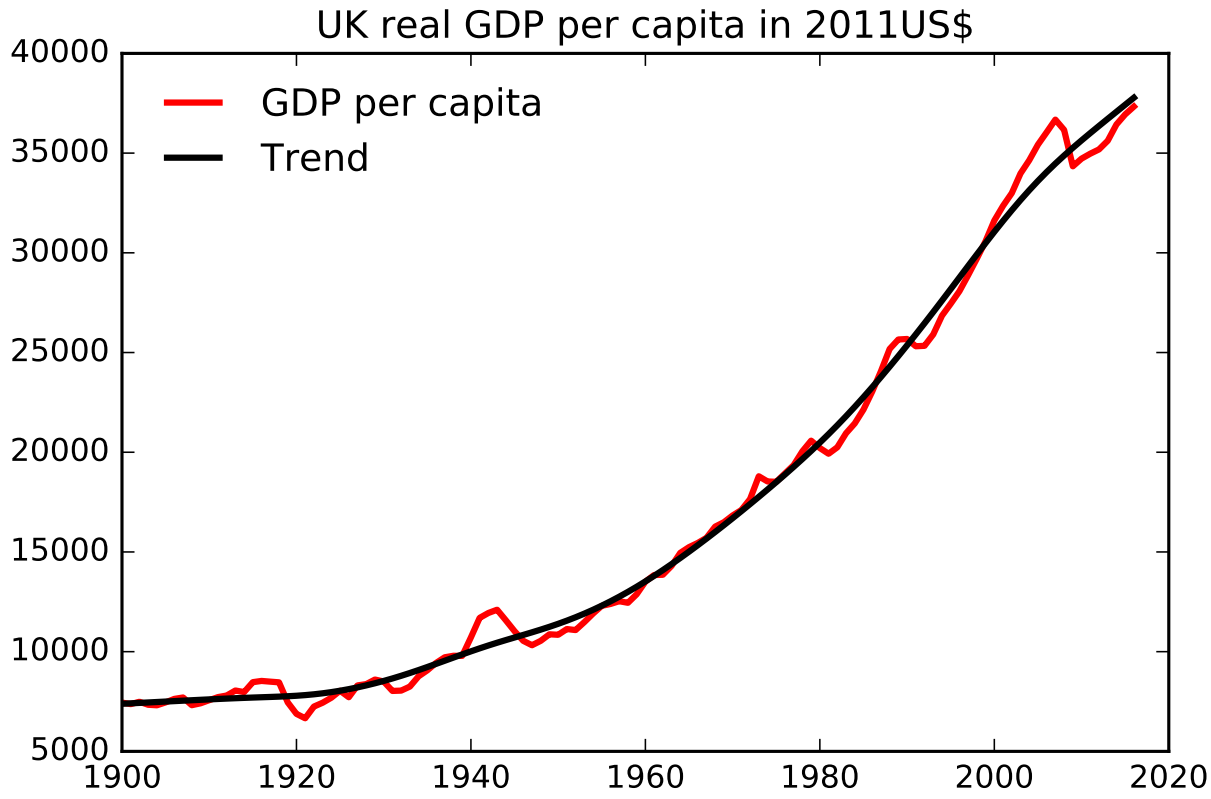
- GDP / capita in 2009 was 12.3 times as large as GDP / capita in 1870 (US)
- 1.8% average growth per year [US]
- 1.5% average growth per year [UK]
- In 1870 the UK was 31% richer than the US, it was 19% poorer in 2009.
- Between 1950-1990, the average growth of income was 5.9% per year in Japan versus 2.1% per year in the US.

Cycles vs Trends



Source: Maddison Project Database, version 2018

Cycles vs Trends

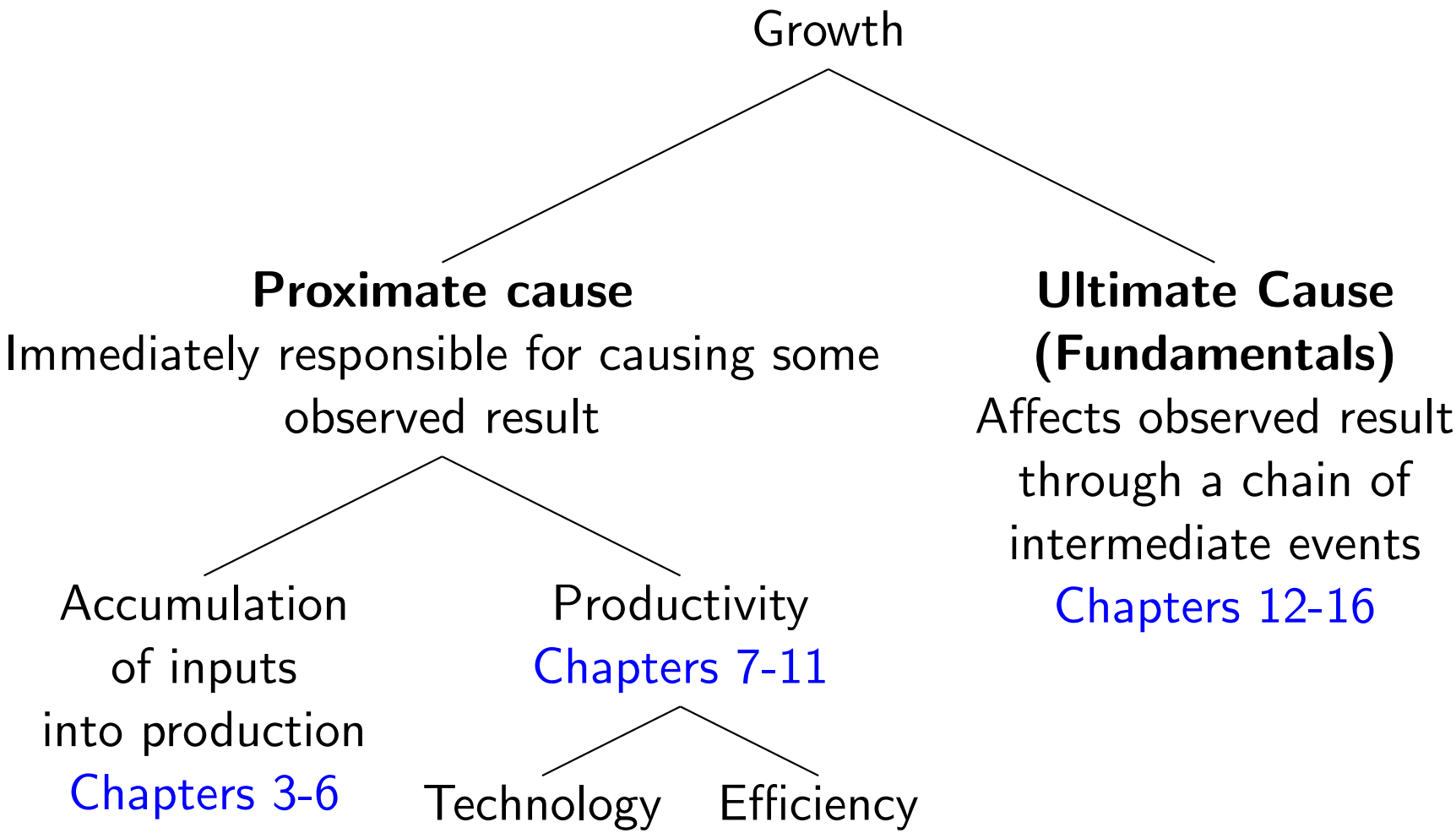


Source: Maddison Project Database, version 2018

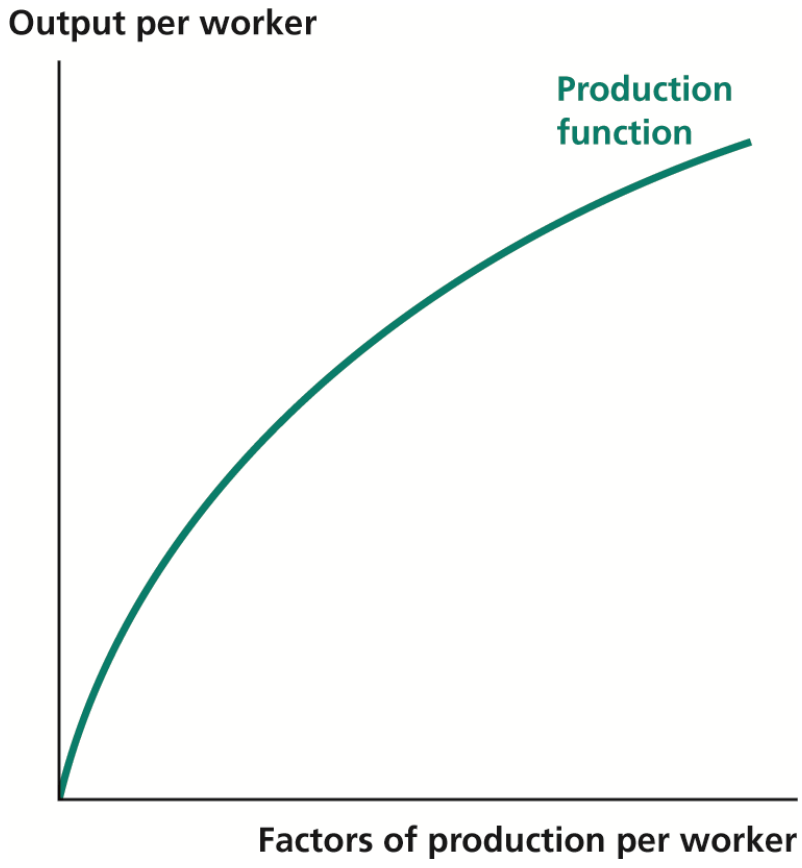
Summary

- Large variations in average income across countries
- Large variations in economic growth rates across countries
- Growth rate of World income has increased
- Changes in growth rates of countries over time
- Relative positions of countries change over time but mostly persistent

Organization of the course

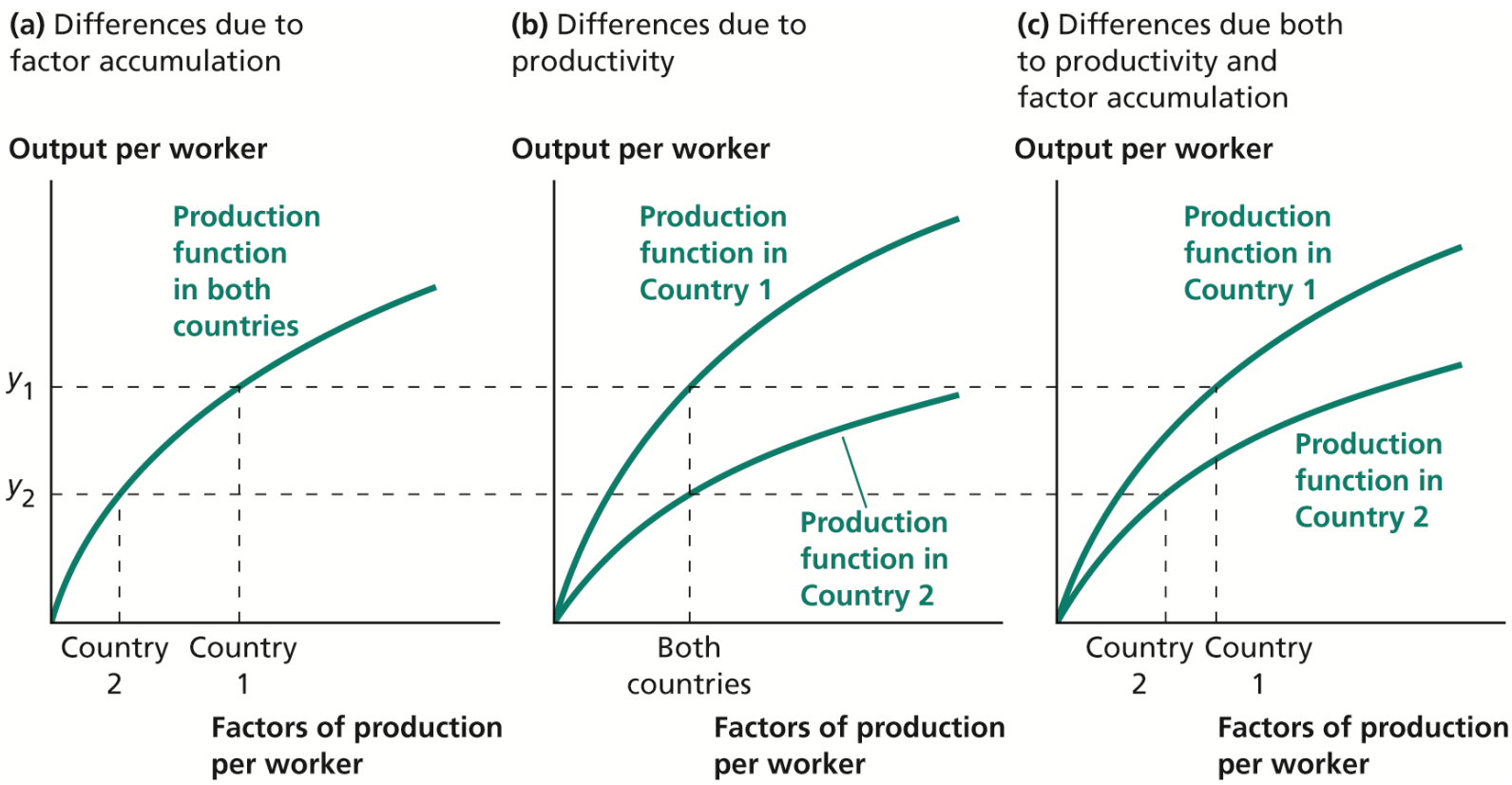


Production Function



Graphic from: Weil (2013)

- Slopes upward: more factors of production, more output
- it becomes flatter as factors of production per worker increases



Graphic from: Weil (2013)

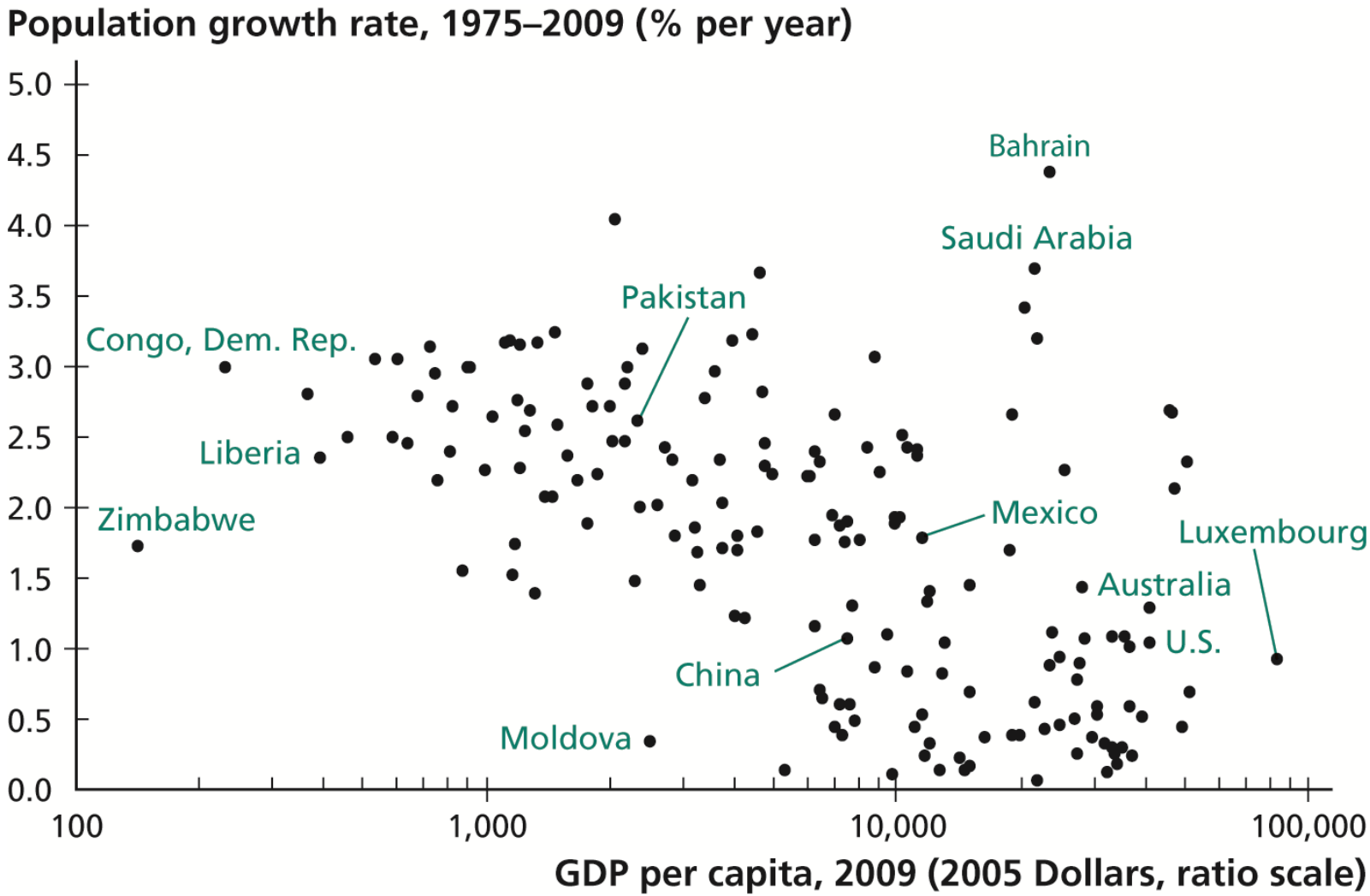
Models

Economic models: simplified representation of reality that can be used to analyze how economic variables are determined, how a change in one variable will affect others

e.g.: What happens to quantity of bread consumed if the price of flour rises?

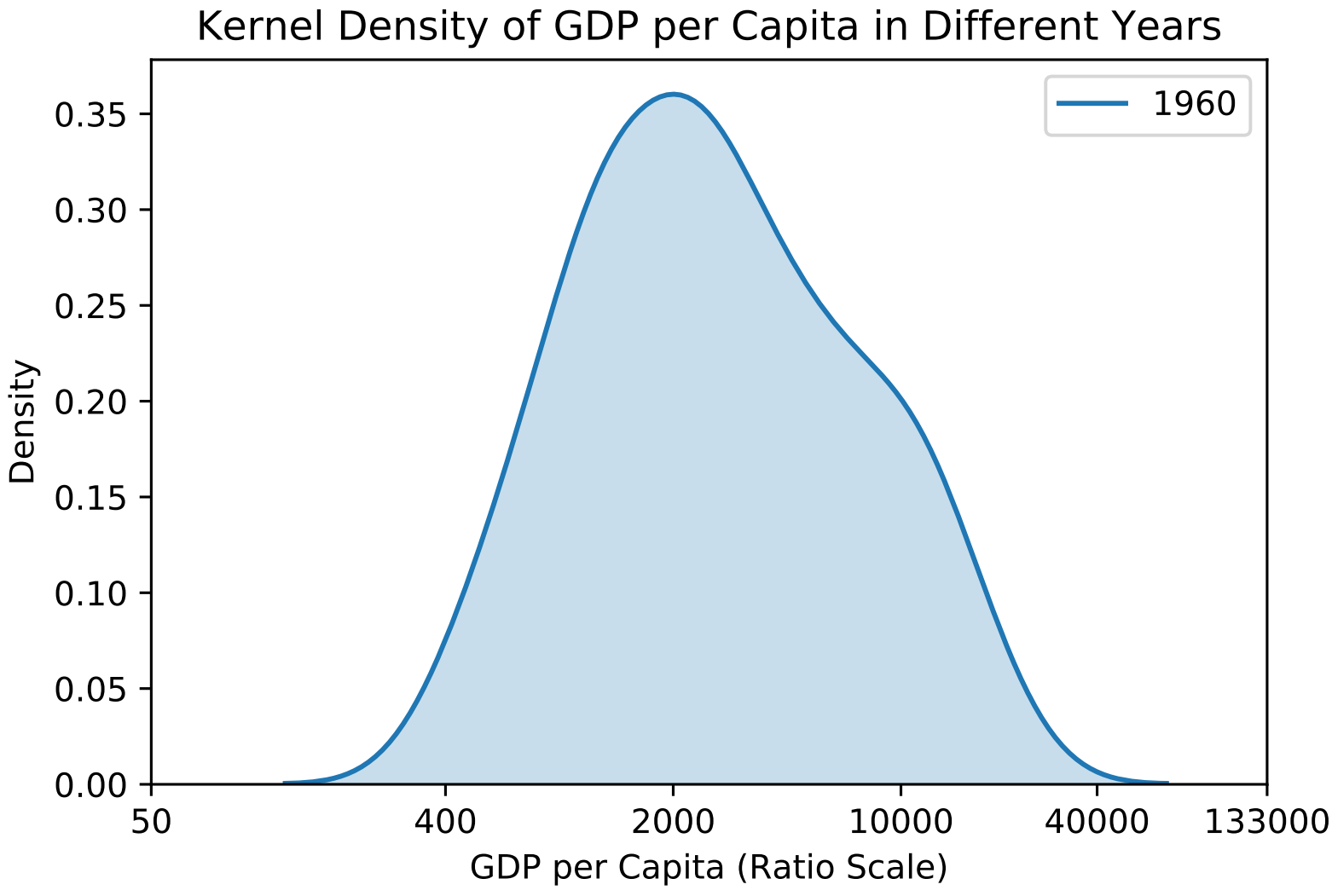
Data

- Testing economic models
- Assigning magnitudes to the different parts of an economic model (Quantitative analysis)
- Scatter plot: represents correlation between two variables
  - correlation between X and Y does not imply causation / causality
  - reverse causation / causality (X causes Y or Y causes X): instrumental variable regression
  - omitted variables (Z causes X and Y or not): multiple regression

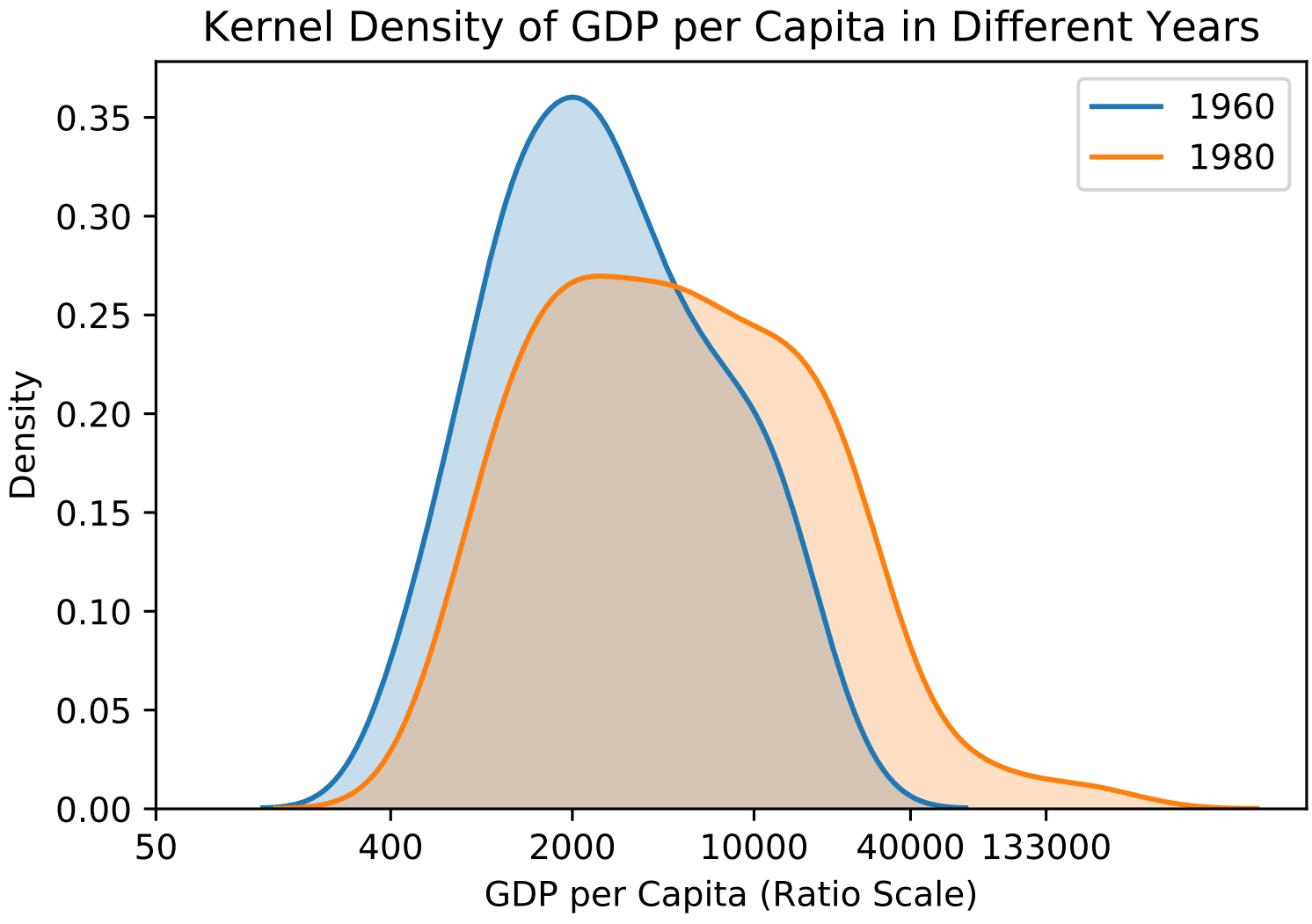

Population growth rate, 1975–2009 (% per year)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Bahrain
Saudi Arabia
Pakistan
Congo, Dem. Rep.
Liberia
Zimbabwe
Mexico
Luxembourg
Australia
U.S.
China
Moldova
100
1,000
10,000
100,000
GDP per capita, 2009 (2005 Dollars, ratio scale)

Thank you!

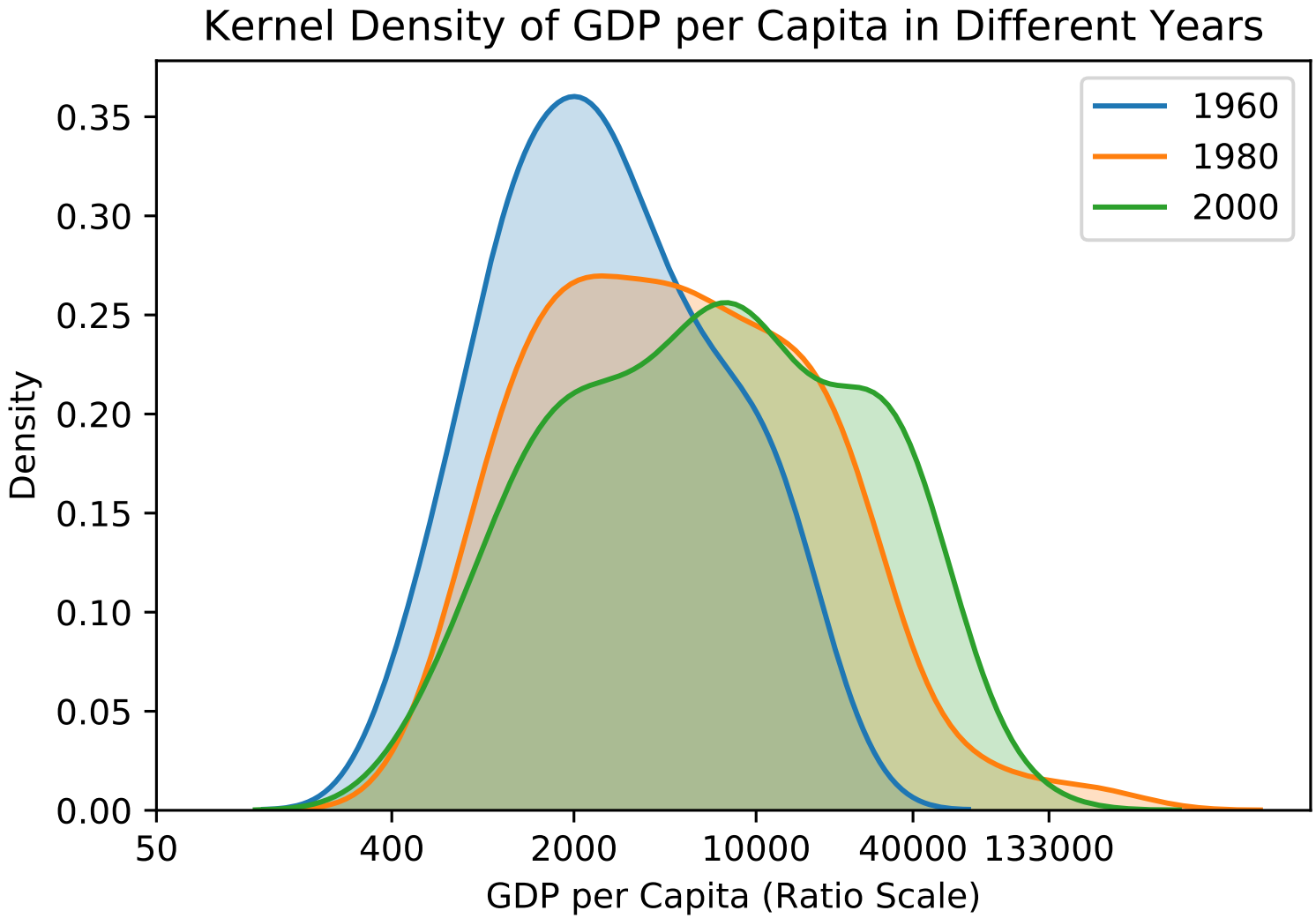
Income distrubution over time



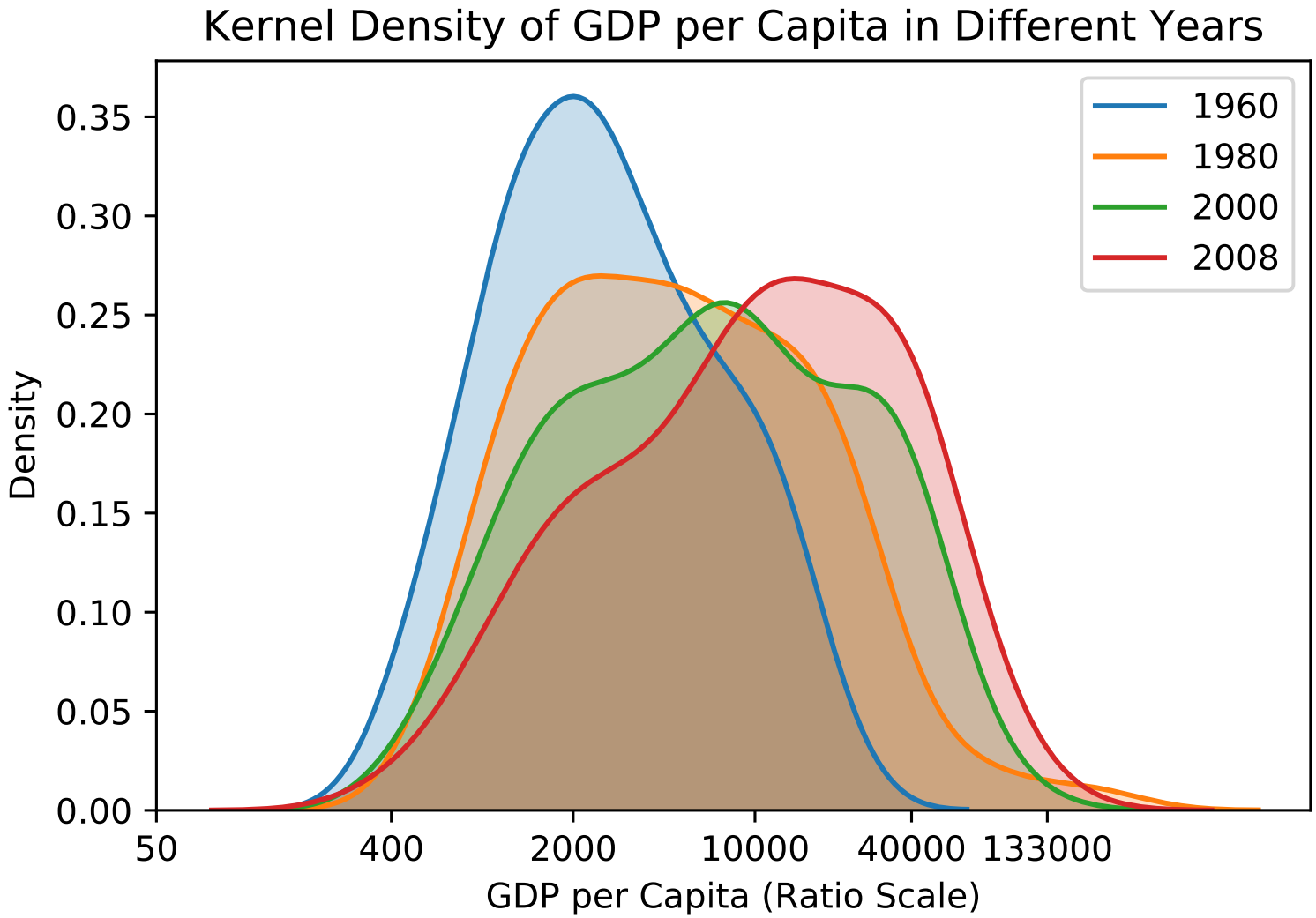
Income distrubution over time



Income distrubution over time



Income distrubution over time



Economic Growth

"Is there some action a government of India could take would lead the Indian economy to grow like Indonesia's or Egypt's? If so, what exactly? If not, what is about the 'nature of India' that makes it so? The consequences for human welfare involved in questions like these are simply stagering: **Once one starts to think about them, it is hard to think about anything else** "

— Robert Lucas Jr., 1988