Introduction

ECON 499: Growth and Development

Spring 2018

Instructor

- Michael Jerman (call me Michael)
- Office: 342 Bexell
- Email: michael.jerman@oregonstate.edu
- Office hours:
  - M/W: 10:30am-11:30am
  - T/Th: 8:30am-9:30am

Prerequisites

- Econ 311 (intermediate micro)
- Econ 320 (intermediate macro)

Textbook

- *Economic Growth*, Weil
  - 3rd edition
- Amazon
  - $108 new
  - $34 used
  - $15 rent (electronic version)
- Bookstore
  - $166 new
  - $125 used
- ABE Books
  - $20 (international version)

Canvas

- Official course website
- You are responsible for any and all information posted to Canvas
- Contact canvas@oregonstate.edu if you have any issues

Homework

- Four graded homework assignments, posted on Canvas
- Mix of problems from the text and other problems
- Work in groups!
  - Each person must submit their own assignment
- Graded primarily on effort and completion
  - 30% of your grade just for doing the homework!

Exams

- Midterm: Thursday, May 8
  - Week 6
- Final: Tuesday, June 12 at 9:30am
  - Note that the university might change the final exam date
- No makeup exams (see syllabus)

Grade

Homework	30%
Midterm	30%
Final	40%

Student conduct

- Student's are bound by the university's Code of Student Conduct
- Any incidence of academic misconduct will result in a grade of "F" for the course
  - Additional sanctions may be imposed by the university

Important dates (Subject to change)

Thursday, April 19	Homework 1
Thursday, May 3	Homework 2
Tuesday, May 8	Midterm
Thursday, May 24	Homework 3
Thursday, June 7	Homework 4
Tuesday, June 12	Final exam

Reading

- This week: Chapters 1 & 2
- Next week: Chapter 3

Homework problems

- Chapter 1 (page 24): 3, 5, 6
- Chapter 2 (pages 46-47): 4, 5

Some facts

- 7.5 billion people alive
- 925 million (12%) people do not get enough food
- 824 million (11%) do not have access to clean water
- 2.5 billion (33%) lack sanitation
- 2.6 billion (35%) earn less than $2 per day

Cross-country differences

- The people that live in the richest 20% of countries earns 60% of world income
- Australia has 687 automobiles per 1000 people, Bangladesh has 2

Differences over time

- A Japanese baby born in 1880 could expect to live 35 years
- A Japanese baby born today can expect 83 years
- Americans spend 3 times as much on recreation as a hundred years ago (as fraction of total income), 1/3 as much on food
- Average workweek in 1870: 63 hours; today 34 hours
- 200 million fewer Chinese people earn less than $2 per day than they did 30 years ago

Income and GDP

- Income is a good, but imperfect measure of well-being
- We can usually measure income across countries (GDP)
- Differences in income are vast, useful for understanding broad patterns in well-being

Real vs nominal GDP

- Nominal GDP is the price of all final goods and services produced within a country in a single year
- Equal to total income (everything that is bought is also sold)
- Price levels change: if all prices increase but we are not producing any more goods and services, nominal GDP will still increase
- Solution: use prices from the same year (2005)
- The **2005 price** of all goods and services produced within a country in a single year is *real GDP*

Purchasing power parity (PPP)

- Prices in each country are denominated in local currencies
- Prices vary greatly across countries
- Solution: calculate the price of a common "basket" of goods in each country, use that price to convert GDP to a common currency (usually 2005 USD)
- In this class we will almost always use PPP adjusted real GDP numbers

Pen's parade of global income

- Suppose we split national income equally among all inhabitants of each country, each person has the national average income (per capita GDP)
- Next suppose each person's height is proportional to their income, with average global income being an average height (6ft)
- Now sit in one place and watch the entire world march by in a parade lasting one hour

First 7 minutes:

- Mostly Sub-Saharan Africans, height less than 1 foot.

India and China:

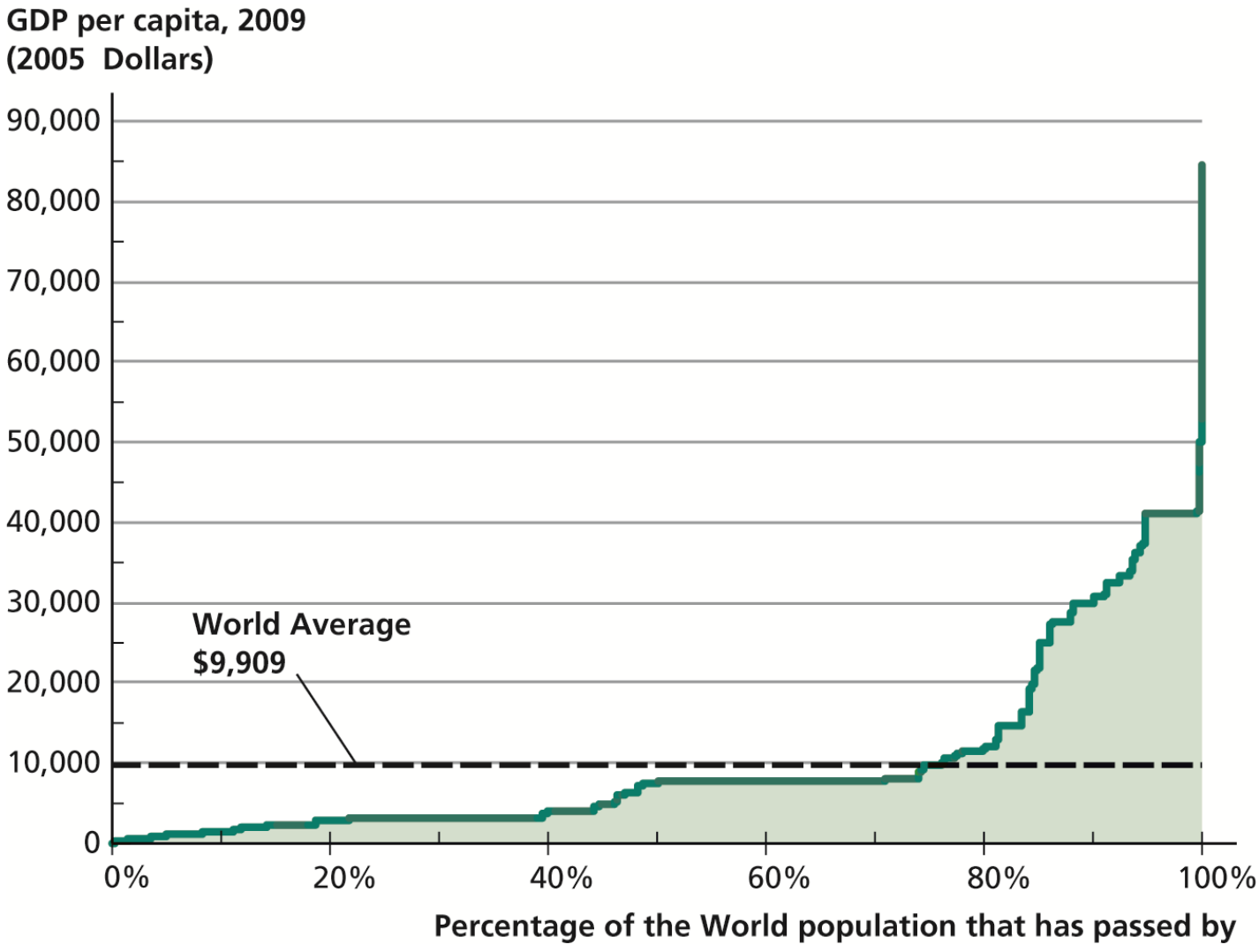
- India begins walking by in the 13 minute, lasting 11 minutes
- Marchers are 23 inches tall
- China begins around 30 minutes (half-way)
- Marchers are 55 inches tall

Average height (income)

- People with the average height start walking by around 45 minutes, after 3/4 of the world has walked by

The giants

- 50 minute marchers are 9ft tall (Croatia)
- 52 minute marchers are 18ft tall (Japan)
- 55 minute marchers are 25ft tall (US)
- The last 15 seconds: Marchers range from 32ft to 95ft tall

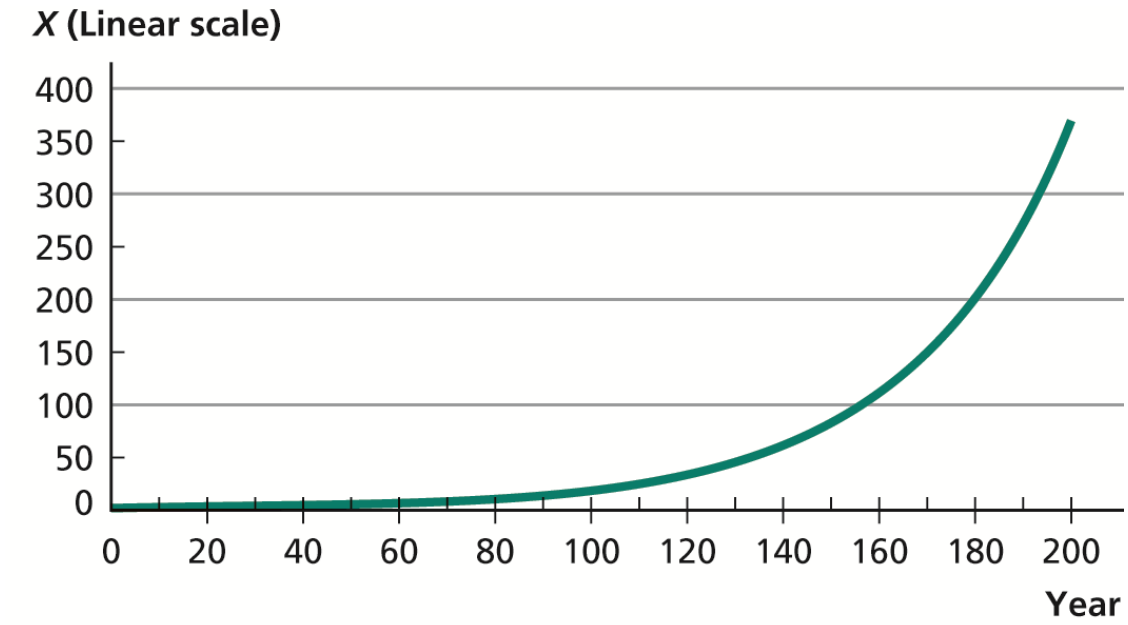

GDP per capita, 2009
(2005 Dollars)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
World Average
$9,909
0%
20%
40%
60%
80%
100%
Percentage of the World population that has passed by

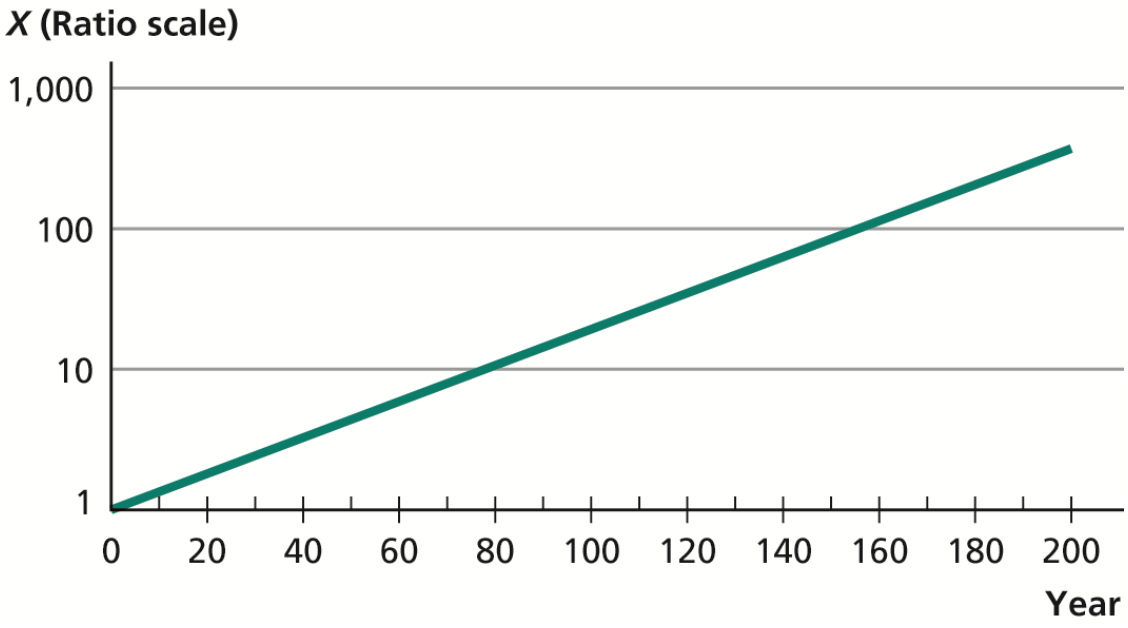
Growth

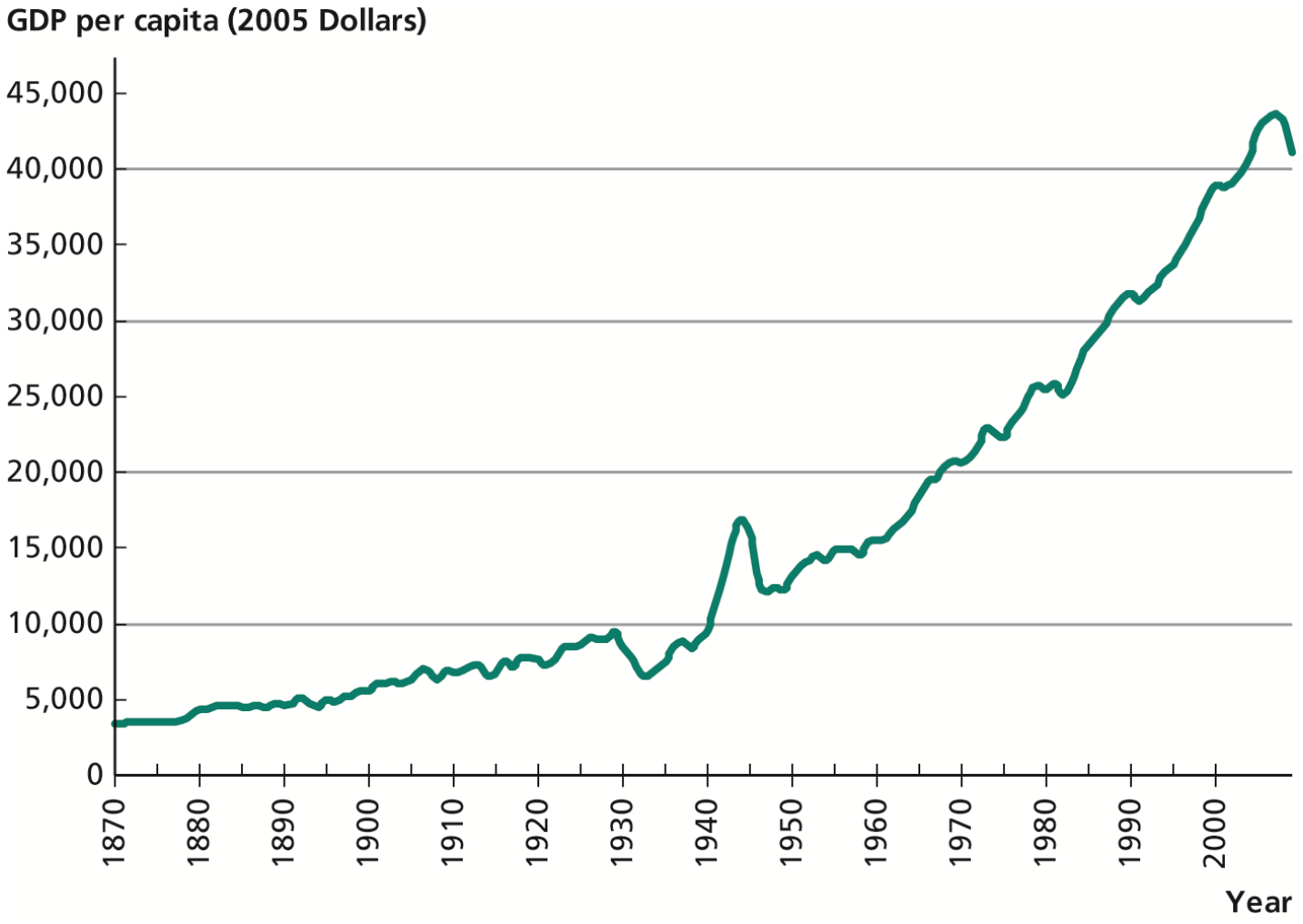
- A "rate of growth" is the *proportional* change in a series over some length of time
- We will usually consider annual growth rates – the rate of change over a year
- Example: China's growth rate of GDP was 6.7% in 2006. This means that China's GDP was 6.7% larger in 2006 than it was in 2005

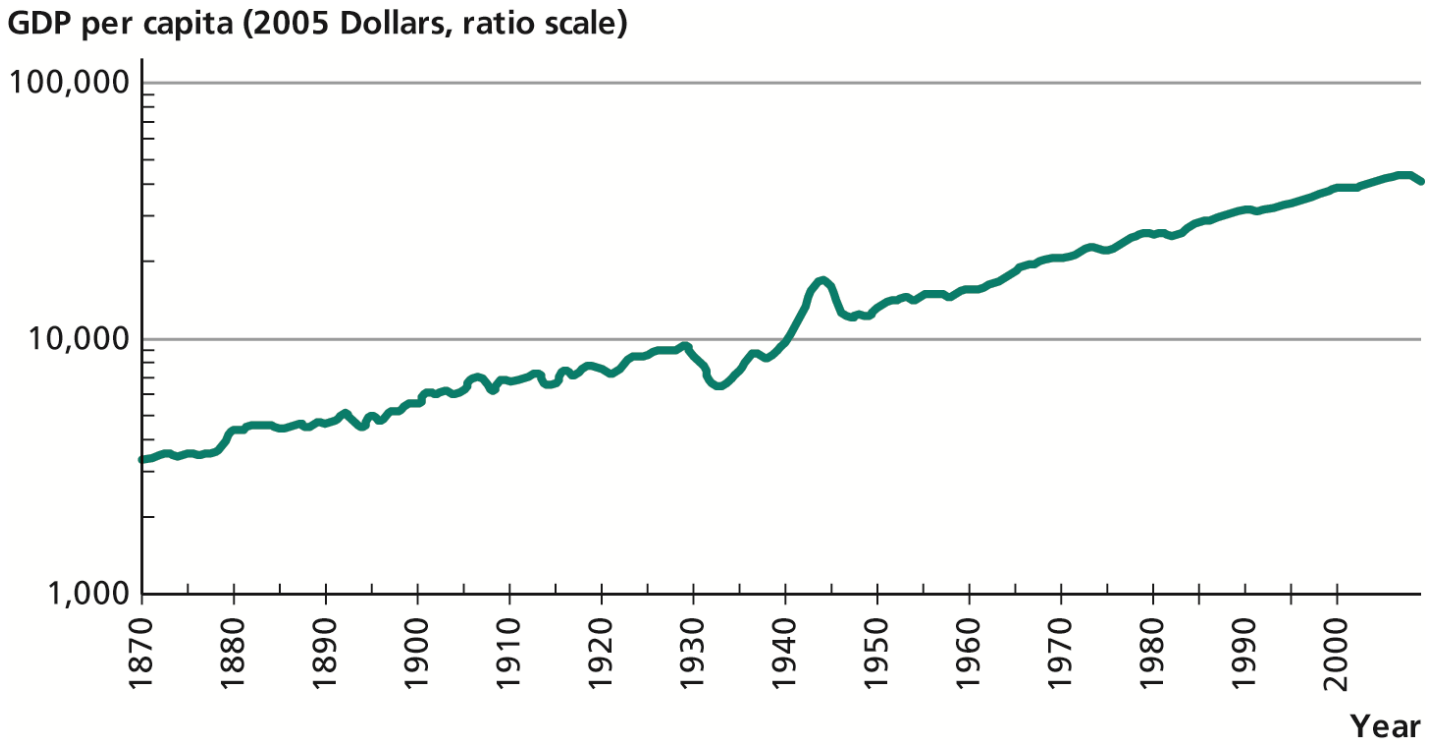
Growth and levels

- A constant growth rate means that a series is growing *exponentially*
- It is common to express exponential growth using a "ratio" (or "logarithmic") scale


X (Linear scale)
400
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200
Year


X (Ratio scale)
1,000
100
10
1
0
20
40
60
80
100
120
140
160
180
200
Year


GDP per capita (2005 Dollars)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year

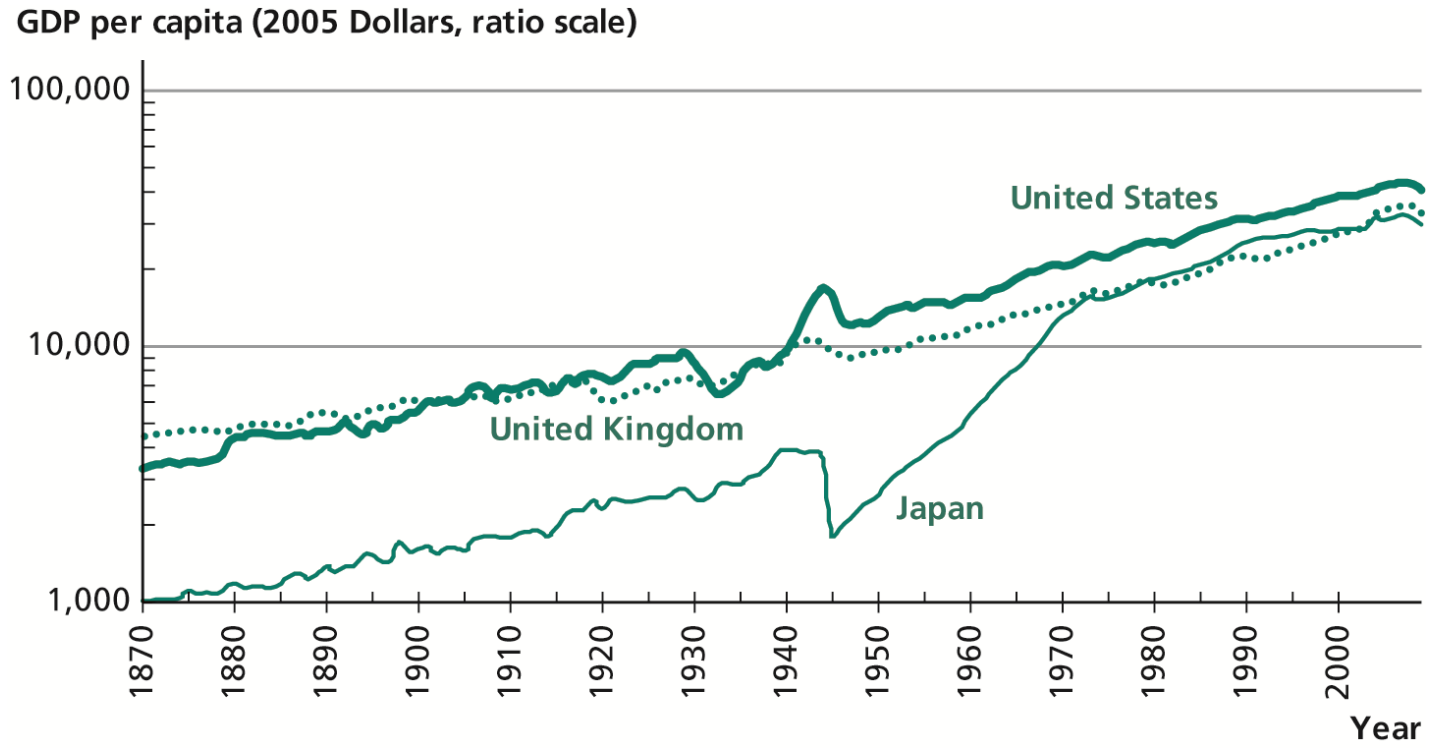

GDP per capita (2005 Dollars, ratio scale)
100,000
10,000
1,000
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year

Rule of 72

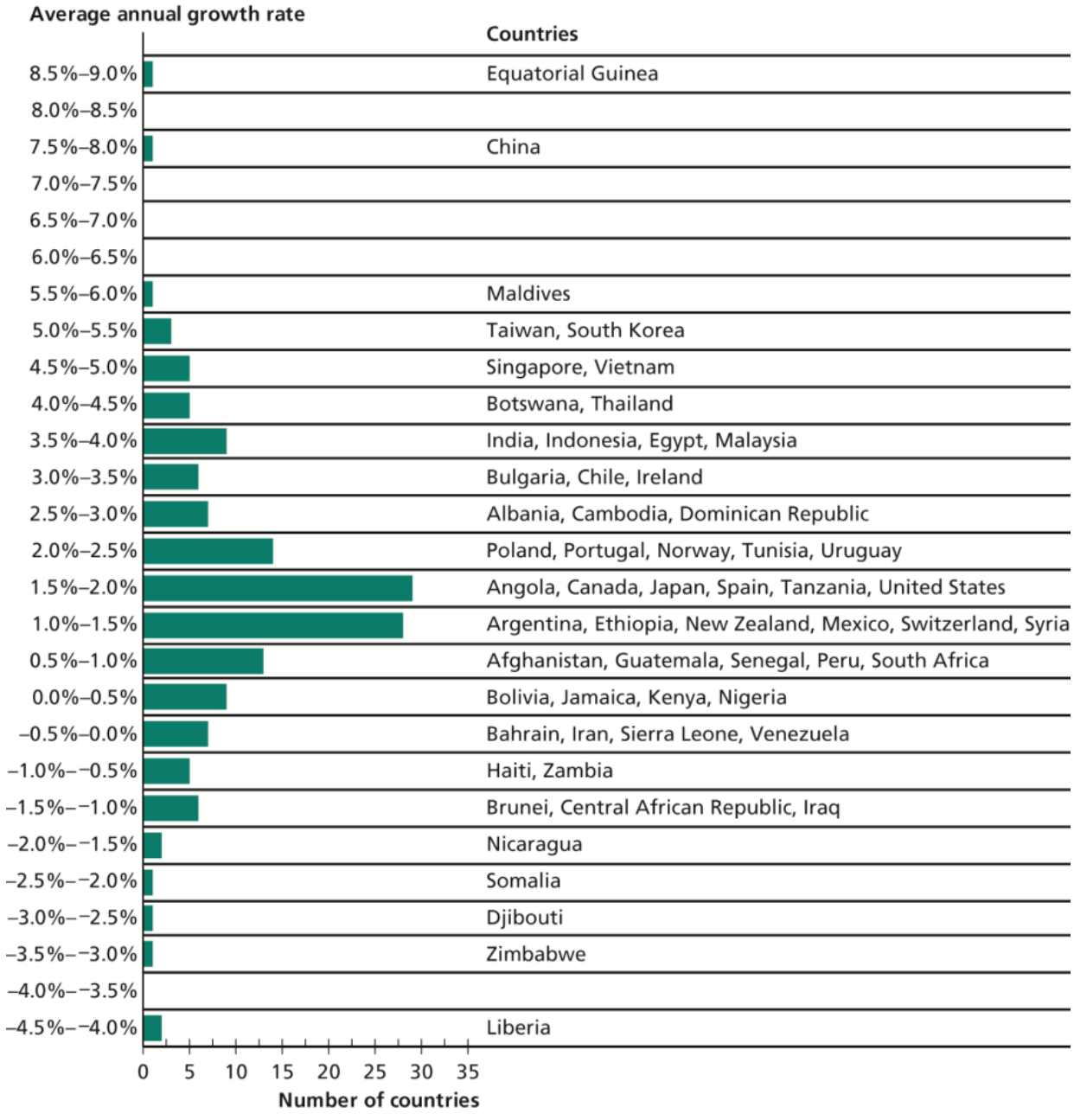
- If a series grows at a rate g per year, the series will double in size every $\frac{72}{100*g}$ years $\left(\frac{72}{g\%}\right)$
- Example: Suppose Chinese GDP grows at 6% every year. Then GDP will double in $\frac{72}{100*0.06} = 12$ years

Growth across countries

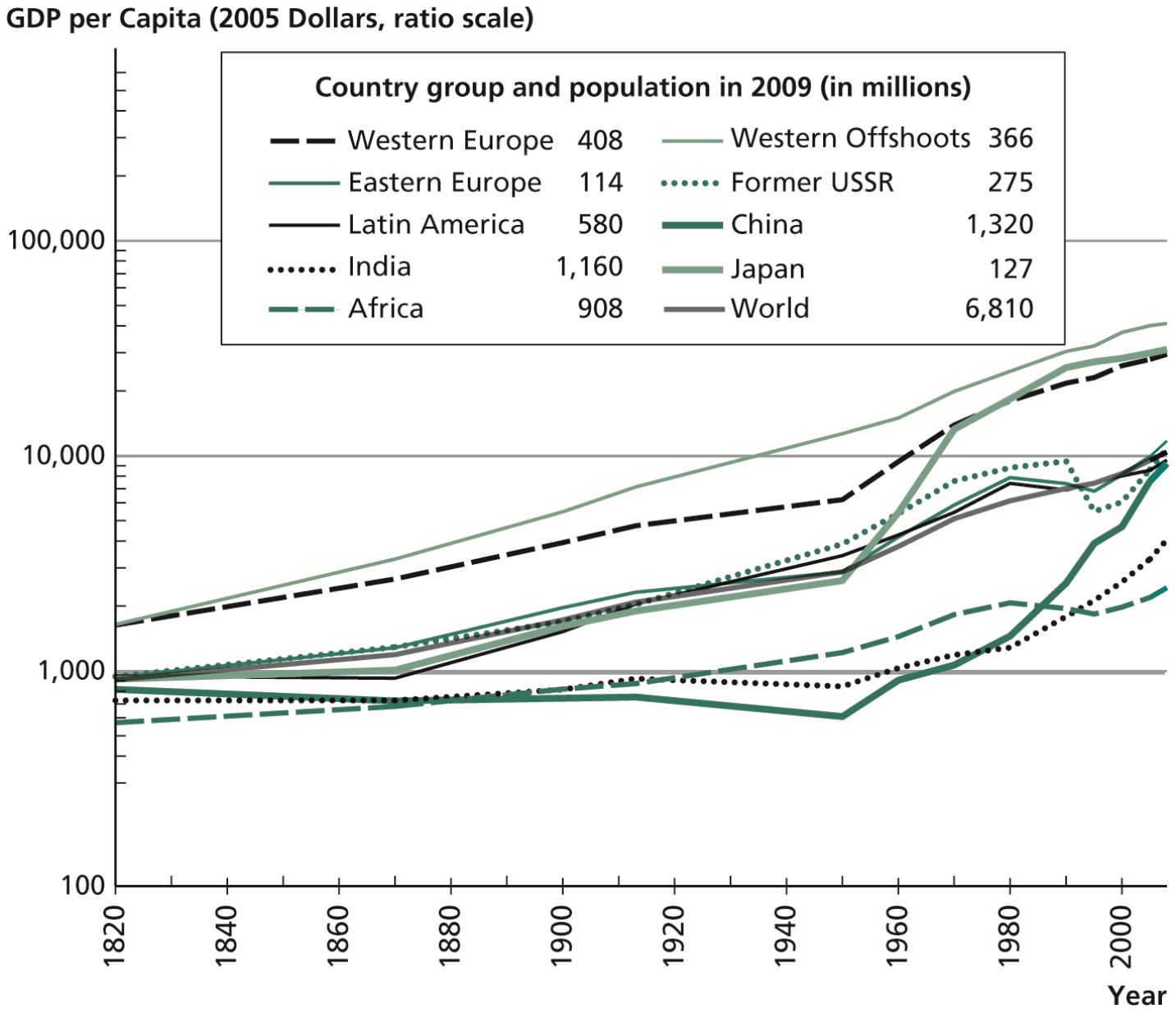
- The US shows remarkably constant growth historically
- In general, it is not the case that countries have constant growth
- The "rule of 72" shows how small differences in growth can translate into vastly different living standards
- Since 1870, US grew at an average of 1.8%, UK by 1.5%
- UK was 31% richer in 1870, 19% poorer today (per capita)


GDP per capita (2005 Dollars, ratio scale)
100,000
10,000
1,000
United States
United Kingdom
Japan
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year

Growth since 1970



Growth since 1820



Global growth facts

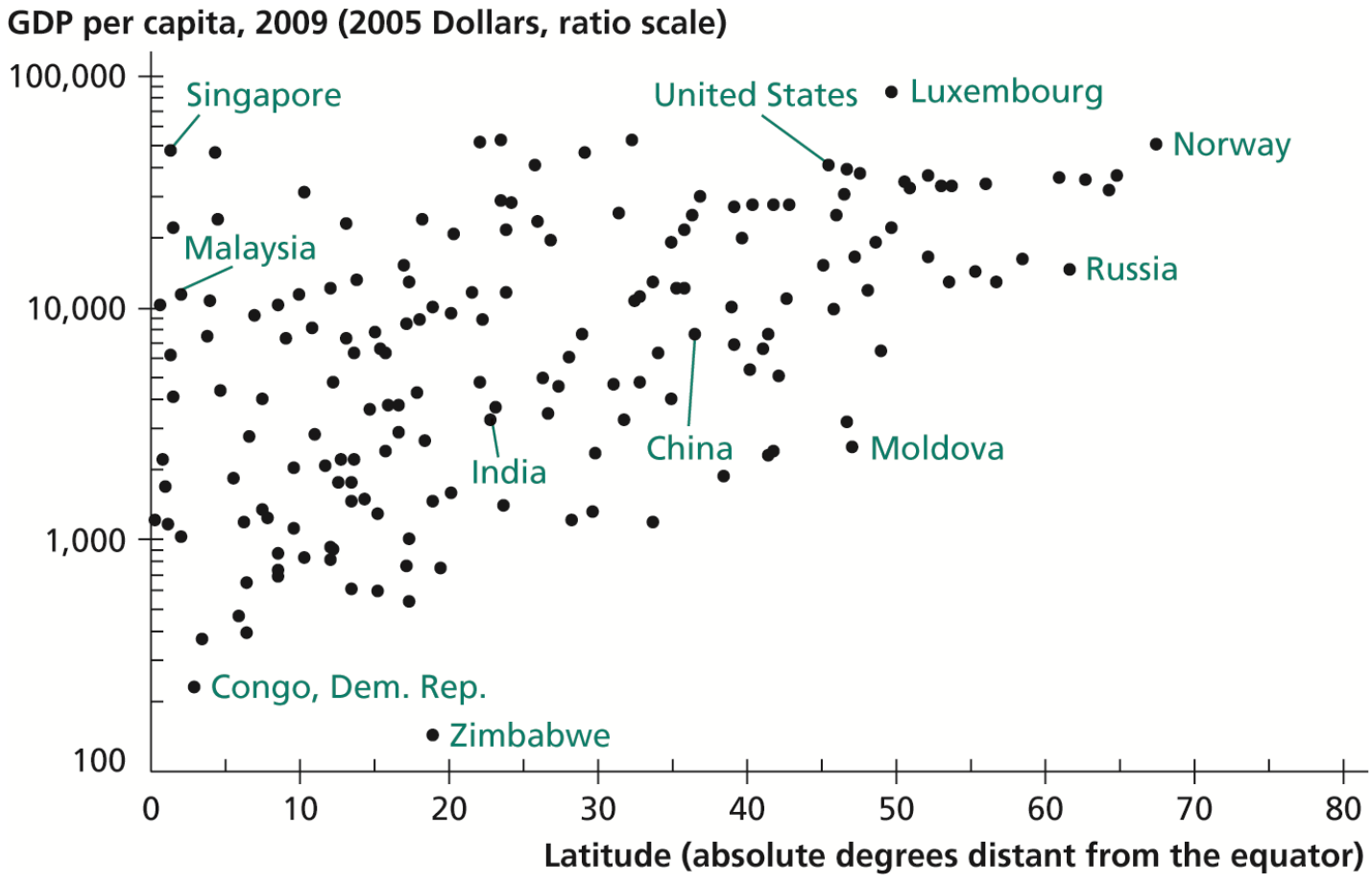
- There is a large variation in growth rates
- World income growth has accelerated over time
- The gap between rich and poor countries is accelerating as well
- Some countries seem to "transition" between growth rates

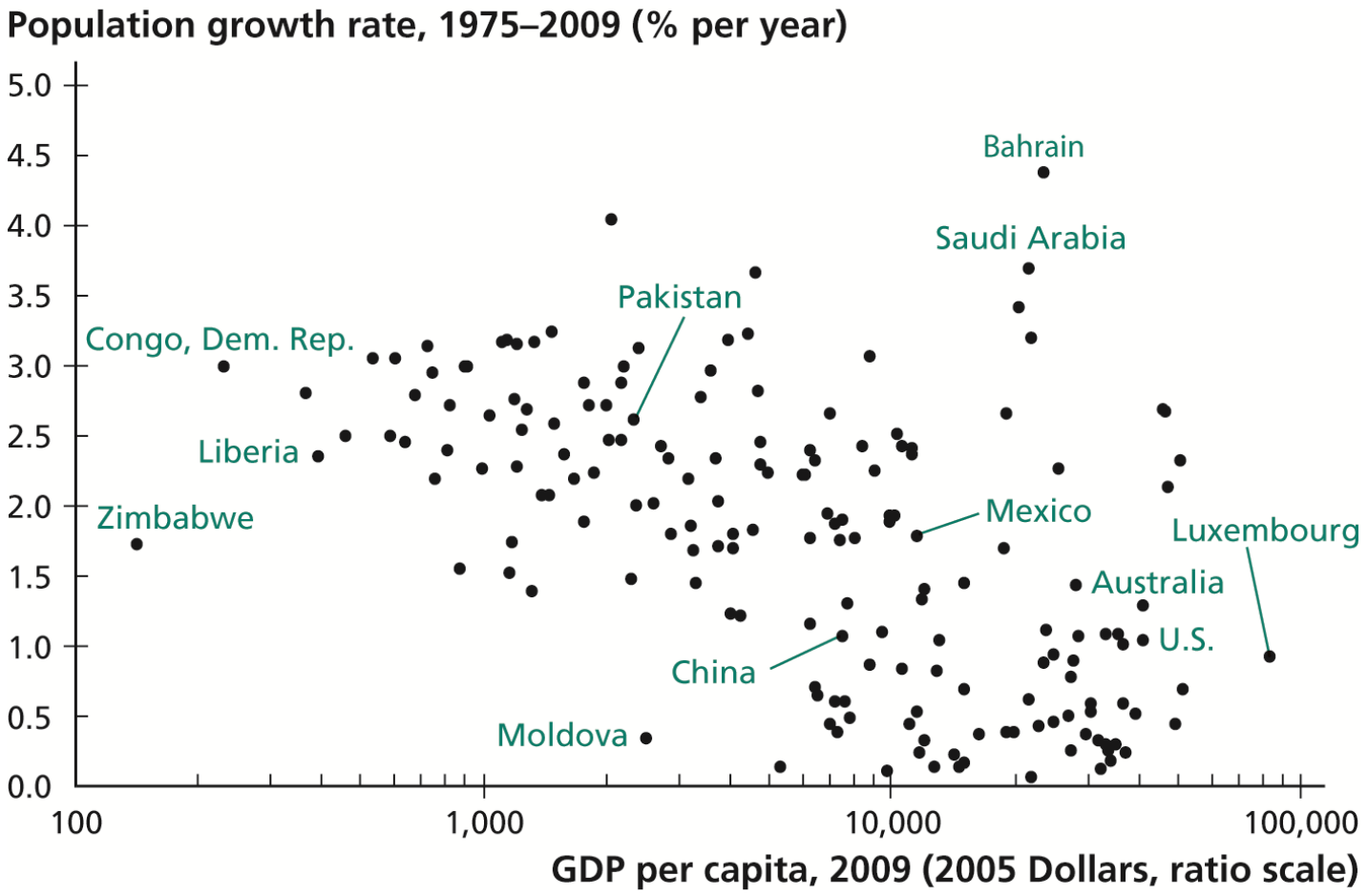
Proximate vs fundamental causes

- The purpose of this course is to investigate what **causes** countries to have different growth rates
- Proximate causes: Things that are immediately responsible for growth, e.g. factor accumulation, investment rates, technology, efficiency
- Fundamental causes: Deeper causes of growth that determine proximate causes, e.g. culture, government, geography, institutions

Using data

- Suppose we think that geography and fertility rates causally impact growth
- How can we determine if this is true?
- One possible solution is to plot the data and see if national income is correlated with our possible determinants


GDP per capita, 2009 (2005 Dollars, ratio scale)
100,000
10,000
1,000
100
Singapore
United States
Luxembourg
Norway
Malaysia
Russia
India
China
Moldova
Congo, Dem. Rep.
Zimbabwe
0
10
20
30
40
50
60
70
80
Latitude (absolute degrees distant from the equator)


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)

Correlation and causality

- Suppose we find that X and Y are correlated, and we suspect X causes Y. There are three possibilities:
  1. X causes Y. If we change X, then we can expect Y to change as a result, just as we predicted.
  2. Y causes X. "Reverse causality." If this is the case, then changing X will not influence Y.
  3. No relationship between X and Y. "Omitted variable bias." A third variable causes both X and Y, but changing X or Y will not influence the other. Only the omitted variable is causally related.

Determining causality

- Suppose we want to determine the causal effect of X on Y
  - Many econometric tools can be used to help determine causality
  - Instrumental variables (IV): Find another variable Z that is correlated with X but not causally related to Y
  - Randomized control trials (RCT): Randomly assign "treatment" and "control" groups. Change X in treatment group, compare Y to control group.
  - It is difficult to randomize a "treatment" across countries, so IV is more common in growth economics. RCT more common in microeconomics, particularly in developing countries.