MACROECONOMICS
73-240

Lecture 12

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Guess the common theme

CNBC

Growth in major Asian economies set to slow more than expected, IMF says

The IMF said in its latest report that growth in Asia could moderate to 5% in 2019, and 5.1% in 2020. That's 0.4% and 0.3% lower than its ...

11 hours ago

CNBC

China's economic growth could fall below 6% in 2020, says the IMF

China's economic growth could moderate further in 2020 — even though the global economy is likely to pick up pace, projected the ...

2 days ago

NBC News

Top economists blame Trump's protectionist policies for global 'stagnation'

President Donald Trump's trade war with China and his protectionist policies are creating a drag on growth that is hurting economies around ...

19 hours ago

RT

India set to eclipse US with global economic growth share by 2024

India is expected to become a much bigger driver of global growth than the world's current largest economy, the US, in just five years, according ...

3 days ago

Wall Street Journal

Global Economy on Course for Weakest Growth Since Crisis

WASHINGTON—The global economy in 2019 is on course for its weakest year of growth since the financial crisis, weighed down by tensions ...

1 week ago

Wall Street Journal

Officials View Trade Uncertainty as Biggest Global Economic Risk

Global economic growth has ebbed this year to its slowest pace since the 2009 recession, the IMF said. The main culprit for the malaise has ...

4 days ago

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Growth: Facts in the Long Run

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Guess which country?

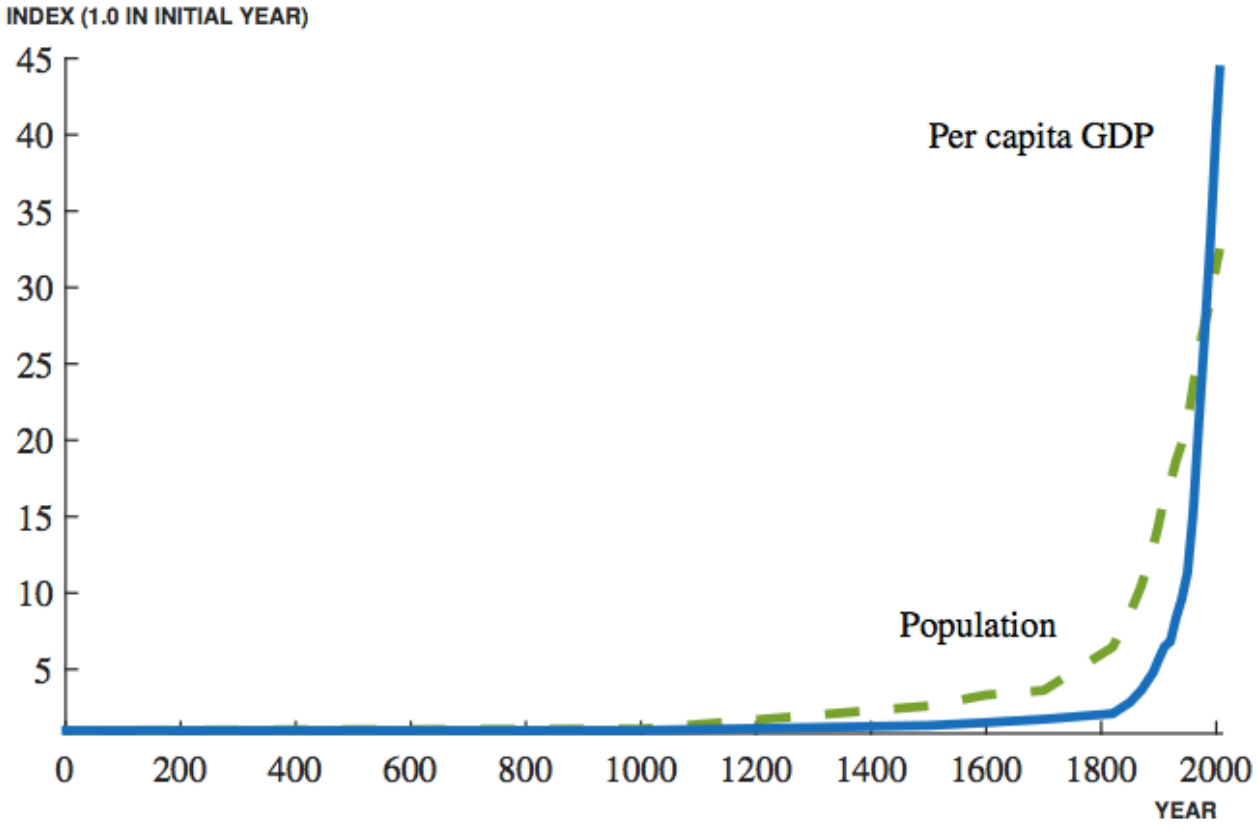
- Life expectancy is less than 50 years
- 1 out of every 10 infants dies before the age of one
- More than 90% of households have no electricity, refrigerator, telephone, or car
- Fewer than 10% of adults have completed high school.

The Power of Economic Growth

- In just a century, the U.S. economy has been completely transformed
  - Almost all households have electricity, refrigerators, cell phones, and cars
  - Overwhelming majority graduates from high school, many college
  - New goods: air-conditioning, dishwashers, jet planes, skyscrapers, home movie theaters, iPads (iPad-pro?)
- Health: Life expectancy in 1900 = 50 years, today 78 years
  - The richest man in the world in the mid 1800s – the great European financier Nathan Rothschild – died from an infection that $10 of antibiotics would cure today.
- A typical college student today will earn a lifetime income about twice his or her parents.

Growth is a recent phenomenon

Figure 2: Economic Growth over the Very Long Run



Note: Data are from Maddison (2008) for the "West," i.e. Western Europe plus the United States. A similar pattern holds using the "world" numbers from Maddison.

- Growth is a very recent phenomenon!

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Growth is a recent phenomenon

Table 2: The Acceleration of World Growth

Year	GDP per person	Growth rate	Population (millions)	Growth rate
1	590	...	19	...
1000	420	-0.03	21	0.01
1500	780	0.12	50	0.17
1820	1,240	0.15	125	0.28
1900	3,350	1.24	280	1.01
2006	26,200	1.94	627	0.76

Note: Data are from Maddison (2008) for the "West," i.e. Western Europe plus the United States. Growth rates are average annual growth rates in percent, and GDP per person is measured in real 1990 dollars.

Growth is a recent phenomenon

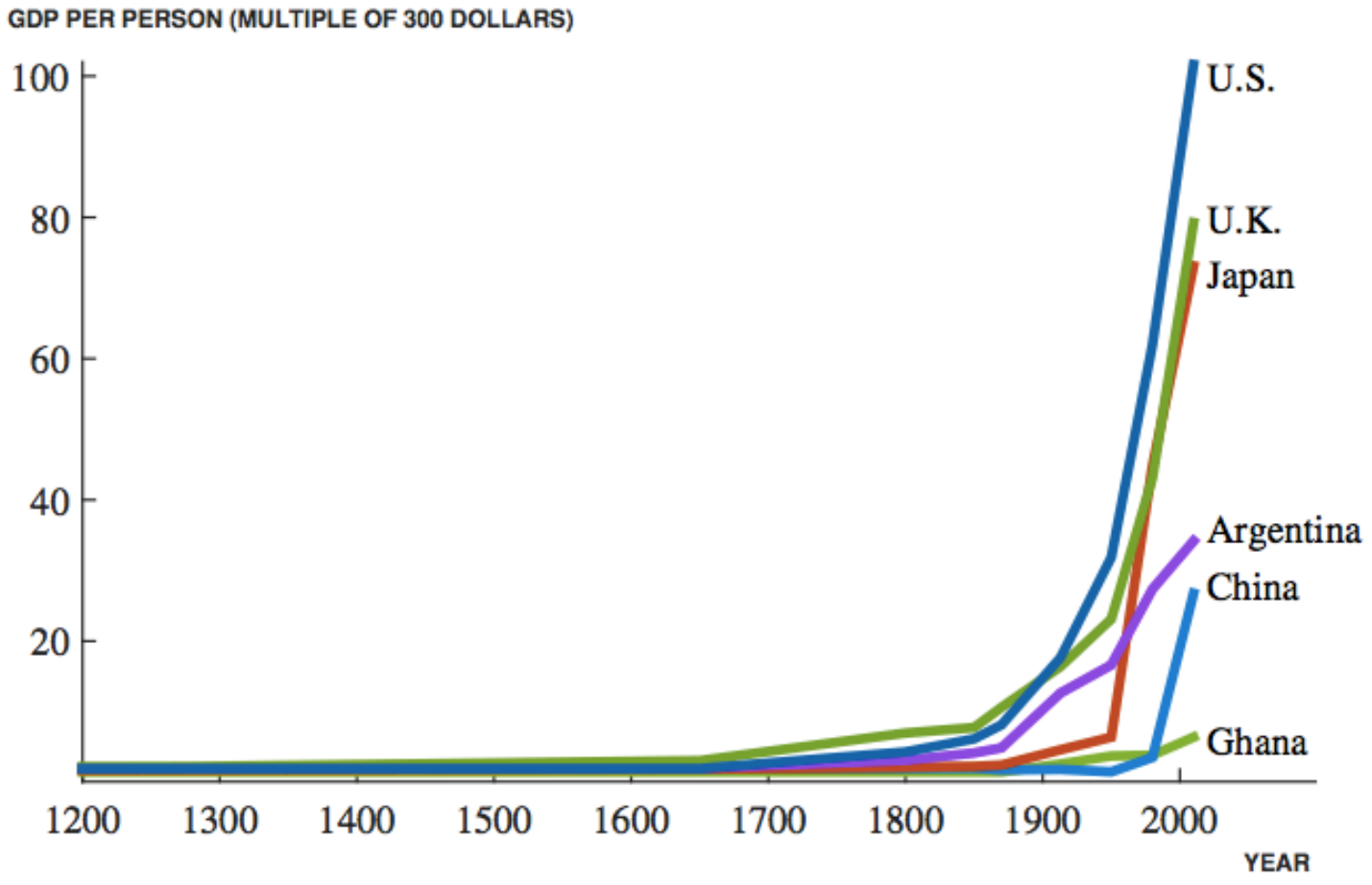
- GDP per capita no higher in year 1000 AD than in year 1.
- Very little improvement between 1820AD and 1000 AD $\rightarrow$ very small annual average growth rates for those 820 years
- Post 1820: rapid take-off
- world GDP per capita in 1998 about 7.5 times its 1820 value.

A uniform experience in sustained growth?

- We now see that growth is a recent phenomenon.
- Did all countries share equally in this growth phenomenon?
- What does inequality across countries look like in the past and in the post 1820 period?

Disparate GDP per capita Across Regions

Figure 21: The Great Divergence



Note: The graph shows GDP per person for various countries, normalized by the value in the United Kingdom in the initial year. Source: The Maddison Project, Bolt and van Zanden (2014).

Growth over the very long run

- Sustained increases in standards of living are a recent phenomenon.
- It emerges in different places at different times.
  - Thus, per capita GDP differs remarkably around the world.
- The Great Divergence: The recent era of increased difference in standards of living across countries.
- Before 1700: Per capita GDP in nations differed only by a factor of two or three.
- Today: Per capita GDP differs by a factor of 50 for several countries.

Questions to ask

- Key take-away: the Great Divergence occurred as modern economic growth took root in different countries at different times
- Hence, understanding economic growth is important for understanding different countries' outcomes.

- Some questions we will ask:
  - Is rapid growth uniformly distributed across countries?
  - How can some countries be 50 times richer than others today?
  - Do starting points matter?
  - Even if we start differently, do we see **convergence** or **divergence**?
  - What do we need to encourage growth?

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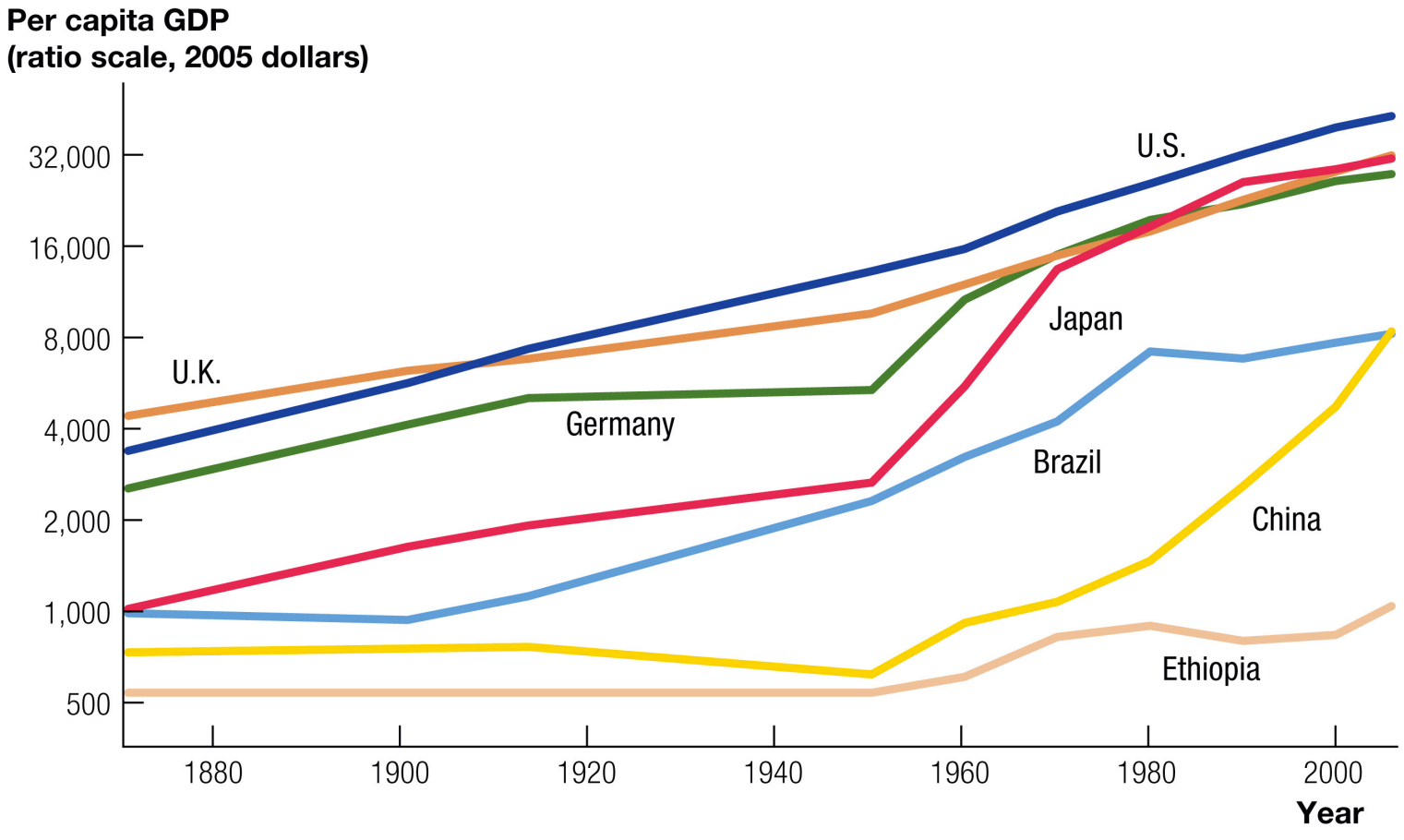
- Is rapid growth uniformly distributed across countries?

Per Capital GDP in Seven Countries, 1870-2006



Source: Jones (2002)

Growth is not uniformly distributed across countries.

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A Broad Sample of Countries

- Over the period 1960 — 2007
  - Some countries exhibit stagnation.
  - Other countries have grown at nearly 6 percent growth.
  - Most countries have sustained about 2 percent growth.

Variation in Growth Rates

The distribution of growth rates:

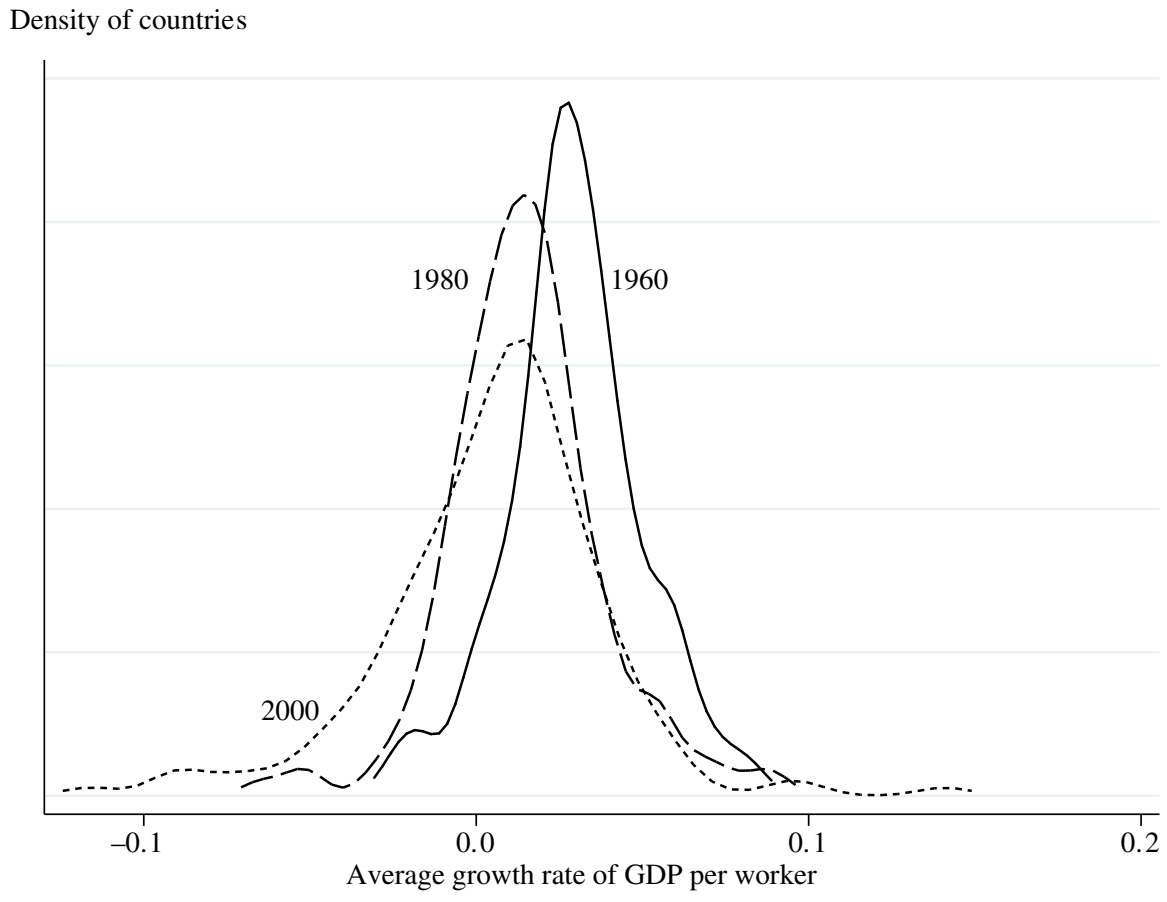

FIGURE 1.7 Estimates of the distribution of countries according to the growth rate of GDP per worker (PPP adjusted) in 1960, 1980, and 2000.

Source: Acemoglu (2008).

2 questions

- How can some countries be 50 times richer than others today
- Do starting points matter?

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1st of 2 questions

- How can some countries be 50 times richer than others today
  - Mechanically, growth rates matter. (It is a deeper question as to why countries grow at different rates, we will address this later)
  - Take two countries A and B, where GDP per capita of B is twice that of A
  - If country A GDP per capita grows at 0% per year and country B grows at 3% per year, in about 110 years, B will be 50 times richer than A
- If we think that GDP per capita is correlated with other measures of welfare (e.g. life expectancy), then we want to encourage growth!

Income Per Capita Over Time

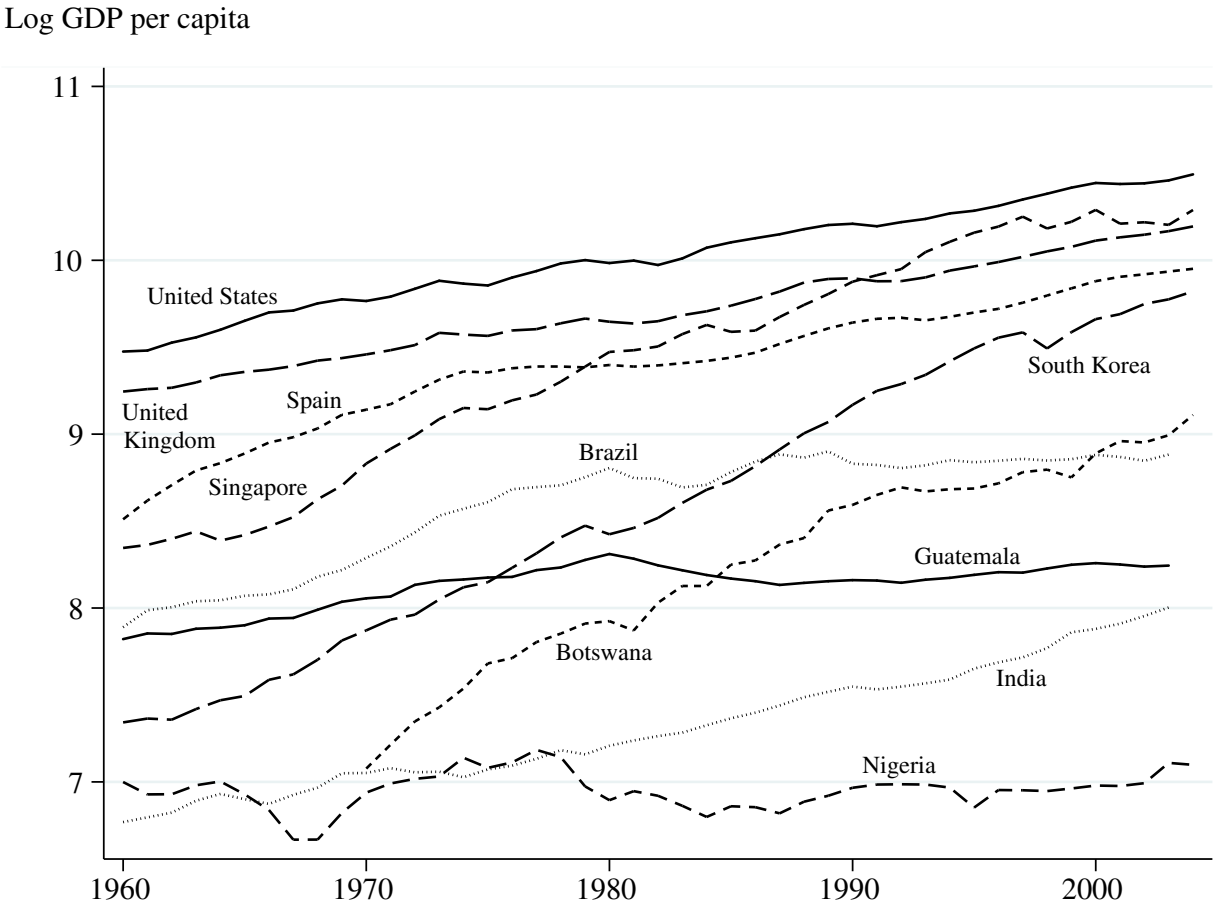

FIGURE 1.8 The evolution of income per capita in the United States, the United Kingdom, Spain, Singapore, Brazil, Guatemala, South Korea, Botswana, Nigeria, and India, 1960–2000.

Source: Acemoglu 2008.

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2nd of 2 questions

- Do starting points matter?
  - South Korea started out poorer than Spain in 1960s
  - But because of rapid growth, was almost as rich as Spain by 2000s.
- Punchline: starting points do not matter. Countries can catch-up and countries can decline.

Do starting points matter?

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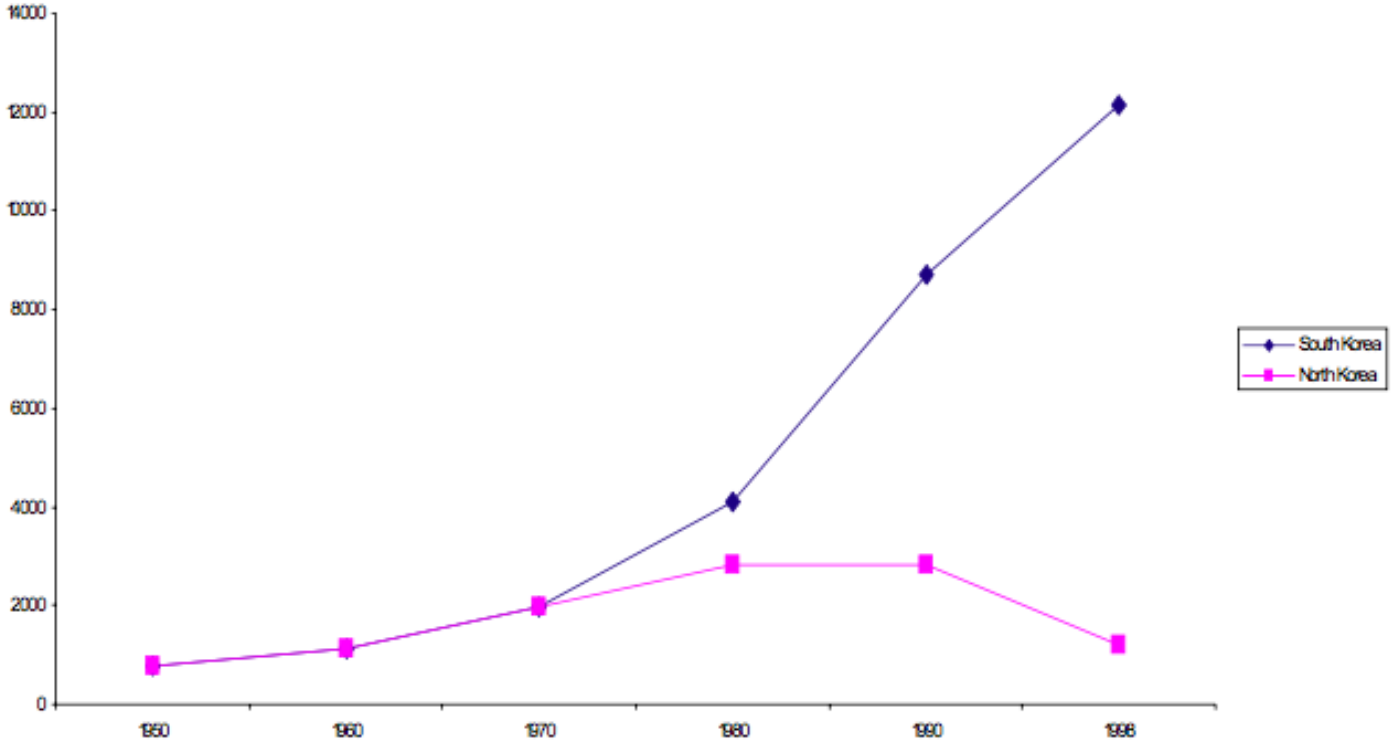
Do starting points matter?

Evolution of income per capita between North and South Korea after separation



Source: Acemoglu (2008)

The experiences of South Korea and North Korea also argue against geography and culture being large determinants of growth.

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How quickly does a country catch up?

- Suppose we wanted to know when a country would double in size
- Suppose we wanted to know when a country would overtake another country in its ranking
- How do we do this?

Growth rates

- We usually denote growth rate for a variable y_t by g_t, then

$$y_{t+1} = y_t(1 + g_t)$$

- If y_t features constant growth rate ($g_t = g$) from year 0 to year t, then

$$y_t = y_0(1 + g)^t$$

- If you know y_t and y_0 and assume constant growth, then

$$g = \left(\frac{y_t}{y_0}\right)^{1/t} - 1$$

- Given g, y_0 and a target y_t, we can calculate how many years it takes for a country to grow to target y_t

$$\ln y_t = \ln y_0 + t \ln(1 + g)$$

$$t = \frac{\ln y_t - \ln y_0}{\ln(1 + g)}$$

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When can China and India overtake the US economy?

- Assume constant growth rates of $g^{CN} = 10\%$, $g^{IN} = 7\%$ and $g^{US} = 2\%$.
- Roughly today: $GDP^{US} = 2GDP^{CN} = 9GDP^{IN}$
- Time to overtake?

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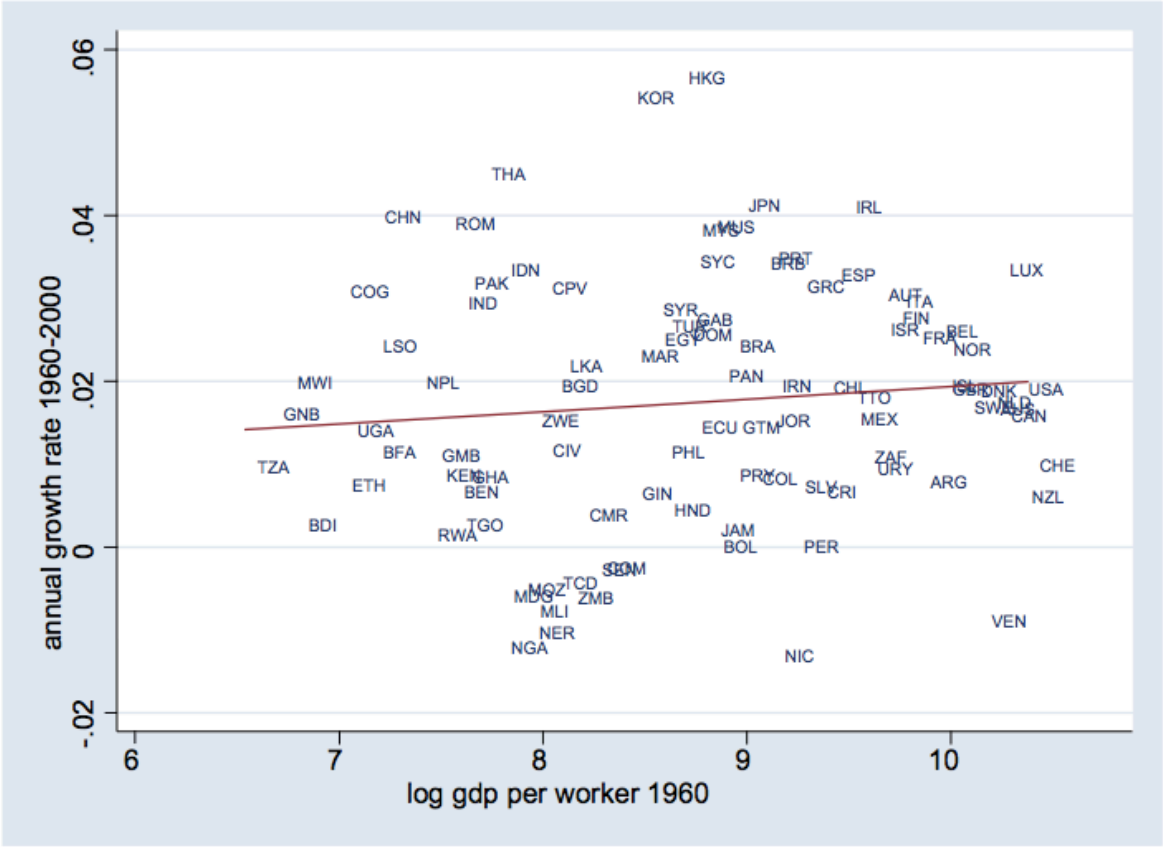
Is there convergence?

- Even if we start differently, do we see **convergence** or **divergence**?
- Convergence would imply that countries which were poor had to experience high growth rates to catch up to countries that were rich.
- Convergence also implies that countries that were rich had to observe lower growth rates so that fast-growing poor countries could catch up.

Are Poor Countries Catching Up?

1960 RGDP per worker vs 1960-2000 Growth Rates



Source: Acemoglu (2008)

- Answer: No

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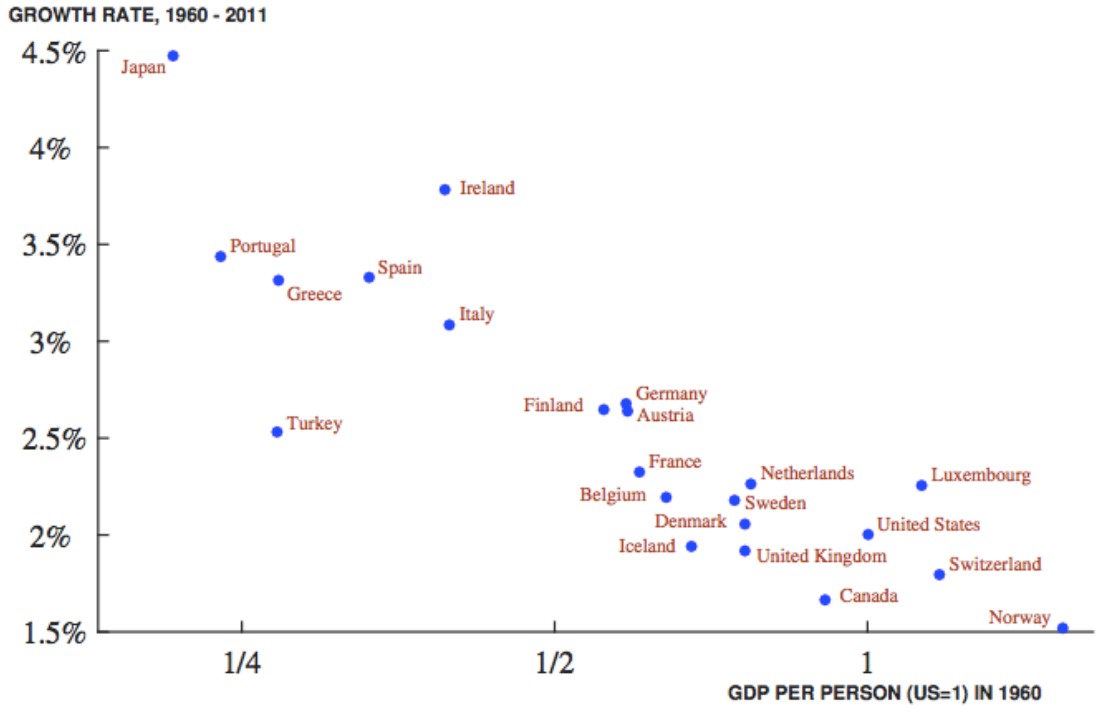
Is there conditional convergence?

Do countries that look the same (institutions, population growth, technology) see convergence?

Figure 25: Convergence in the OECD



Source: Jones (2014)

- Answer: yes!

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- What do we need to encourage growth?
- Should we care about growth?

Growth: Facts from the Long-Run
(Why do we care About Growth? About RGDP Growth?)

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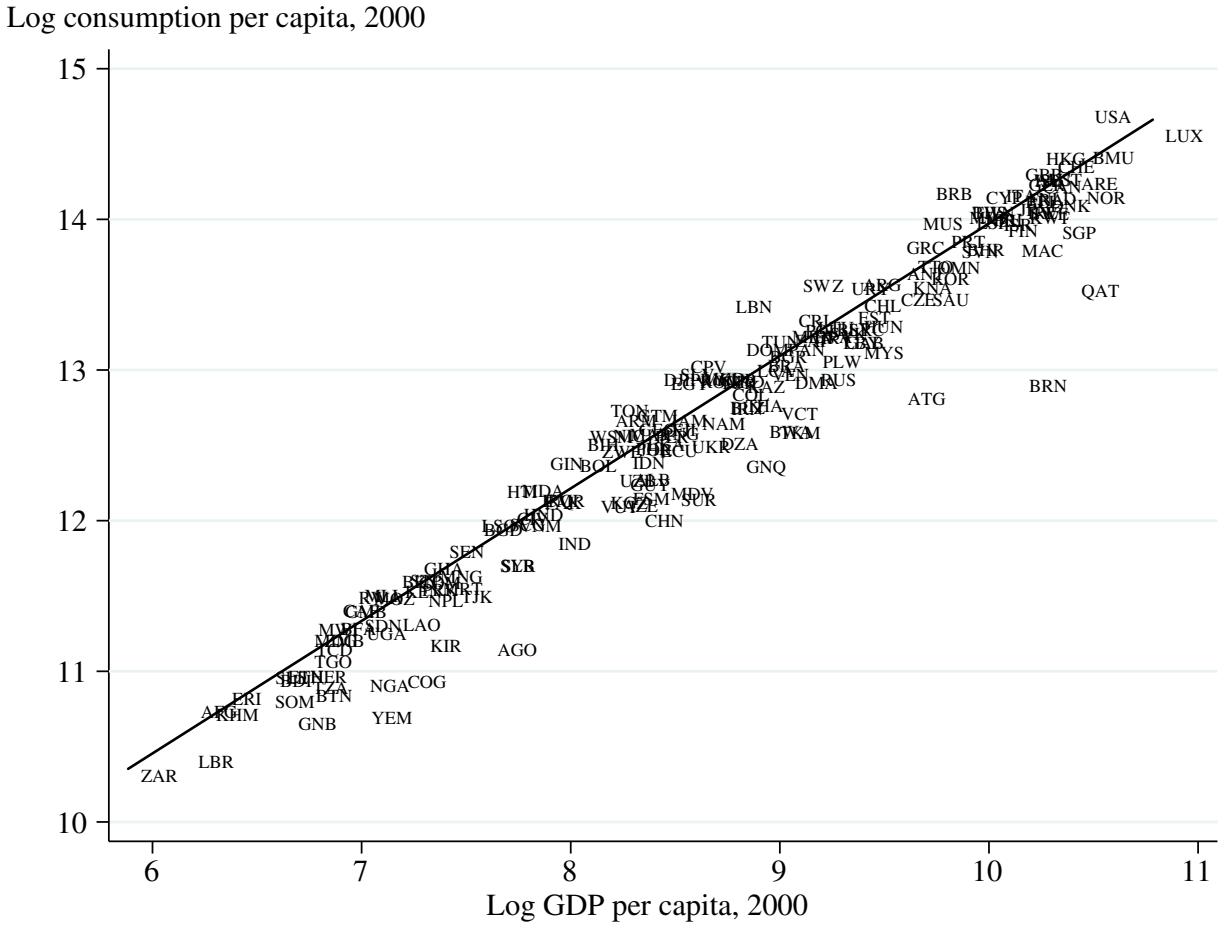
Welfare: Consumption



Source: Acemoglu (2008).

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Welfare: Life Expectancy

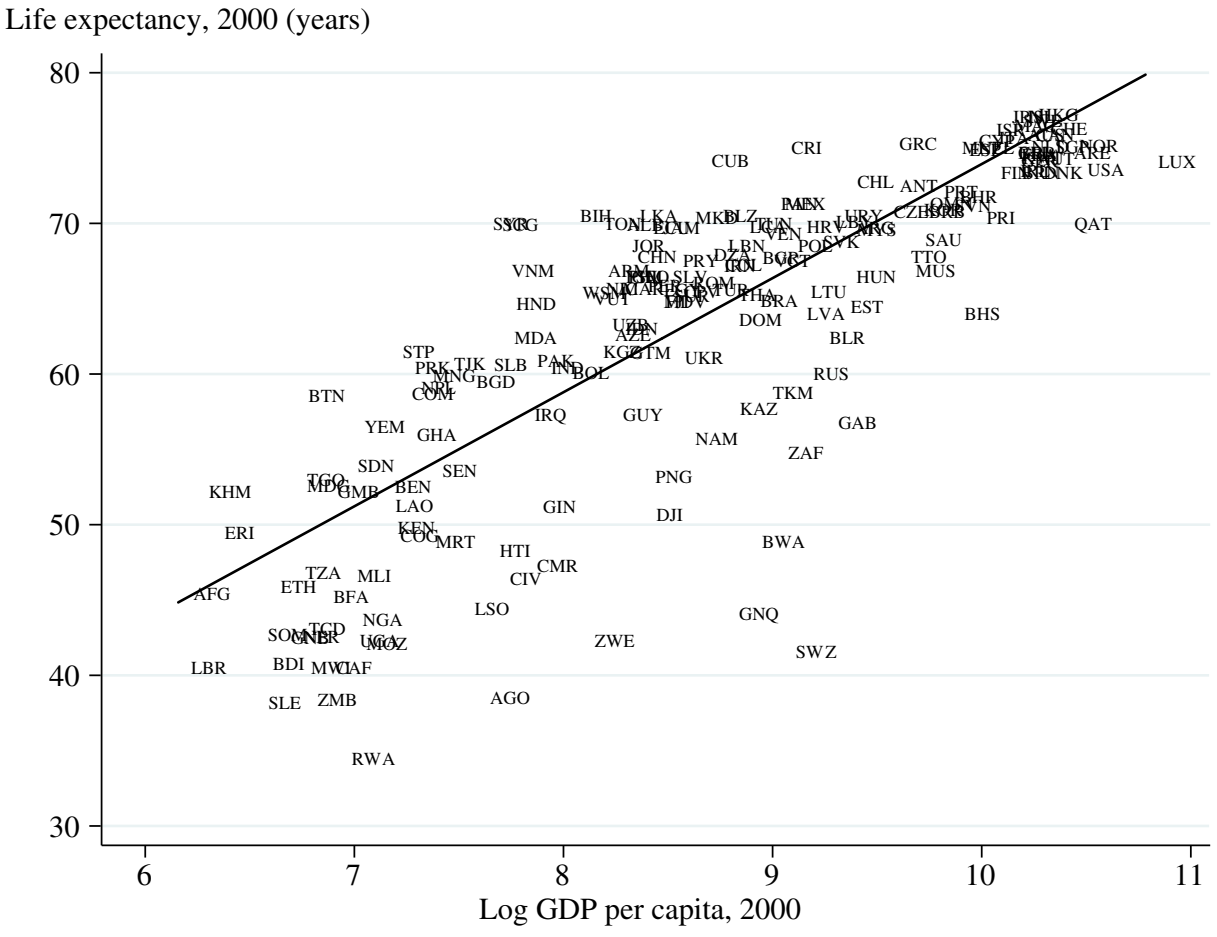

FIGURE 1.6 The association between income per capita and life expectancy at birth in 2000.

Source: Acemoglu (2008).

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The Costs of Economic Growth

- The benefits of economic growth
  - Improvements in health
  - Higher incomes
  - Increase in the variety of goods and services
- Costs of economic growth include:
  - Environmental problems
  - Income inequality across and within countries
  - Loss of certain types of jobs
- Economists generally have a consensus that the benefits of economic growth outweigh the costs.

What explains differential growth?

- Starting from production function

$$Y = zK^{\alpha}N^{1-\alpha}$$

- We want to understand differences in output per capita over time

- Suppose $N = labor =$ population (strong assumption!), then output per capita, $y =$

$$y = \frac{Y}{N} = \frac{zK^{\alpha}N^{1-\alpha}}{N} = zk^{\alpha}$$

where $k = \frac{K}{N}$

- could it be differences in capital per capita (k)?

- could it be differences in total factor productivity z?

- Or maybe what matters is in the denominator of $y = Y/N$, i.e. N

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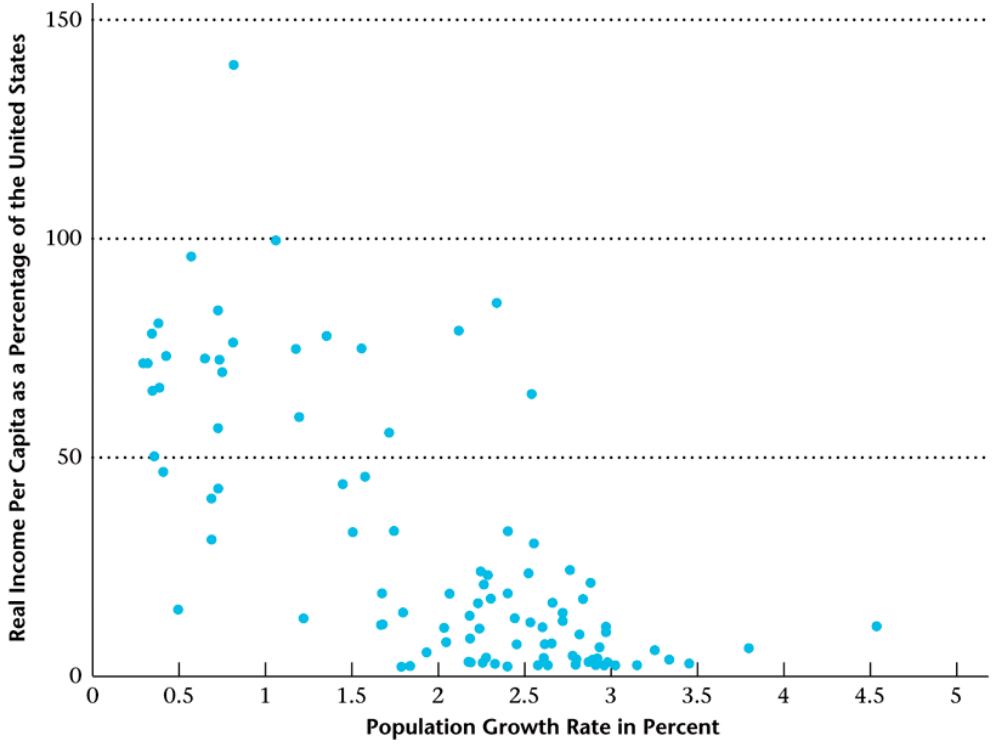
What Determines Growth?

Great resource for data is: pwt.econ.upenn.edu



Source: A. Heston, R. Summers, and B. Aten, *Penn World Table Version 6.1*, Center for International Comparisons at the University of Pennsylvania (CICUP), October 18, 2002, available at pwt.econ.upenn.edu.

Population growth is negatively correlated with GDP levels.

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Road Map for Next class

- What can explain the lack of growth before 1820
- What can explain differential growth of countries post 1820