

# Analysis of IR

PS 1599 | Week 2: Welfare and Technology

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# Admin

- Office hours
- Email
- Website (slides)

What did we talk about last time?

# Today

- Last time:
  - Welfare can be a legitimate goal for humankind
- Today (and next week):
  - Definition of welfare (+measurement)
  - History global/European development
  - Connection to technology

# **Welfare: definition and measurement**

- Welfare = good
- True for both **utilitarianism** and **egalitarianism**
- Okay, but *what* is welfare?
- In practice: vastly diverging views.

How would you define  
(and measure) welfare?

- Not an academic question
- Two approaches to define welfare
- 1st: **subjective**. Let people say what makes them “well”
- **Pros:** flexible, respectful of personal views
- **Cons:**
  - Are all personal views legitimate in society?
  - Hard to measure

- 2nd approach: **objective**. Decide for all of us what is ‘legitimate’ welfare.
- Potential candidates: physical wellbeing, happiness, equality of opportunity, access to resources, etc
- **Pros:** avoids ‘bad’ preferences; can be measured
- **Cons:** defines welfare in a narrow way (spiritual? etc.)

# Two things to note...

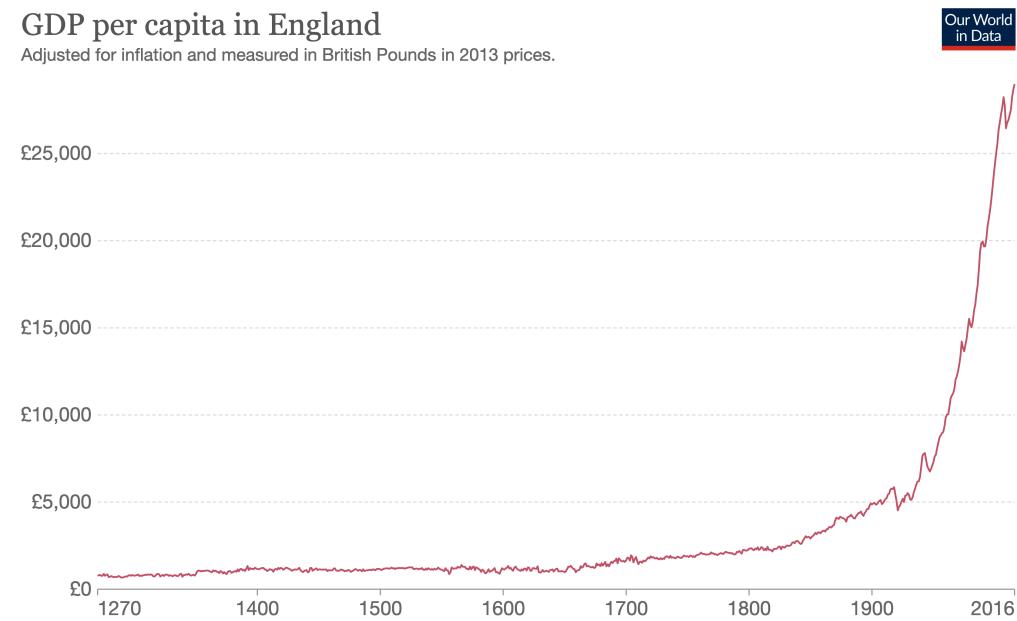
- 1. These obj measures can be equated to “development”
- Narrow version: how modern an economy is
- Amartya Sen’s version: economic opportunities + political freedom + protection from extreme poverty
- Broad version: adds social stuff (gender rights, etc.)
- Often criticized: western-centric, materialistic
- Often measured by the Human Development Index: schooling + GNI (similar to GDP) + life expectancy

- 2. Most of these measures can be proxied by **economic growth**
- Often measured by GDP:
  - Value of goods+services produced in a jurisdiction during a certain time
  - Eg GDP of Pennsylvania for 2022 is \$722b
- Note:
  - Not the same as household income/wage, but close
  - Doesn't tell us about **distribution** of income
  - Economic growth  $\neq$  development

# Physical well-being

GDP per capita in England

Adjusted for inflation and measured in British Pounds in 2013 prices.

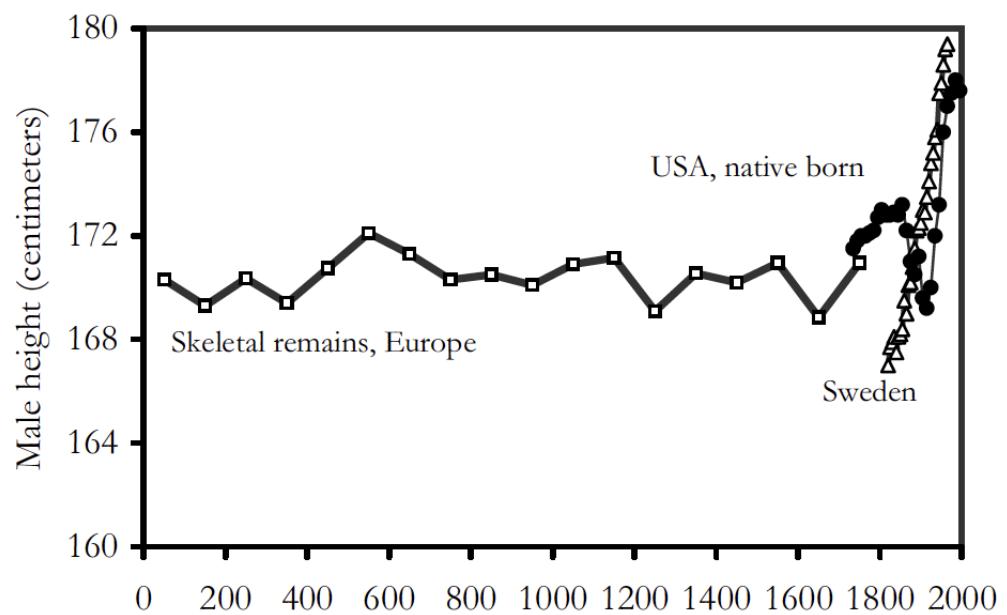


Source: Broadberry, Campbell, Klein, Overton, and van Leeuwen (2015) via Bank of England (2020)

Note: Data refers to England until 1700 and the UK from then onwards.

OurWorldInData.org/economic-growth • CC BY

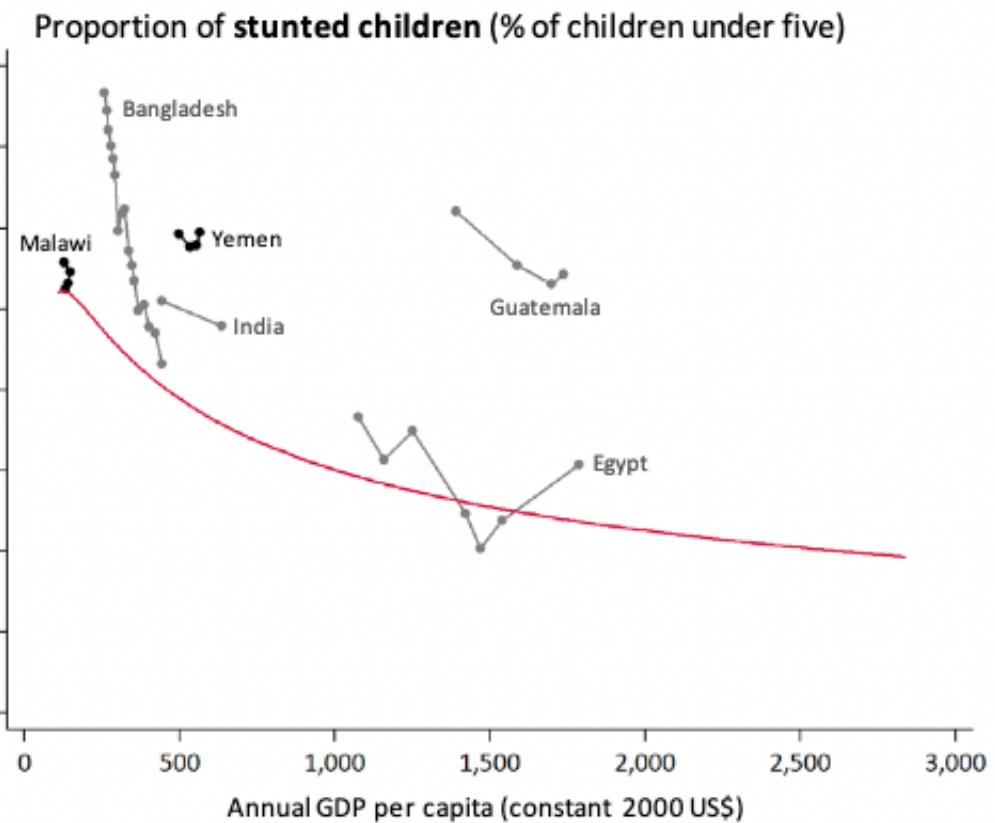
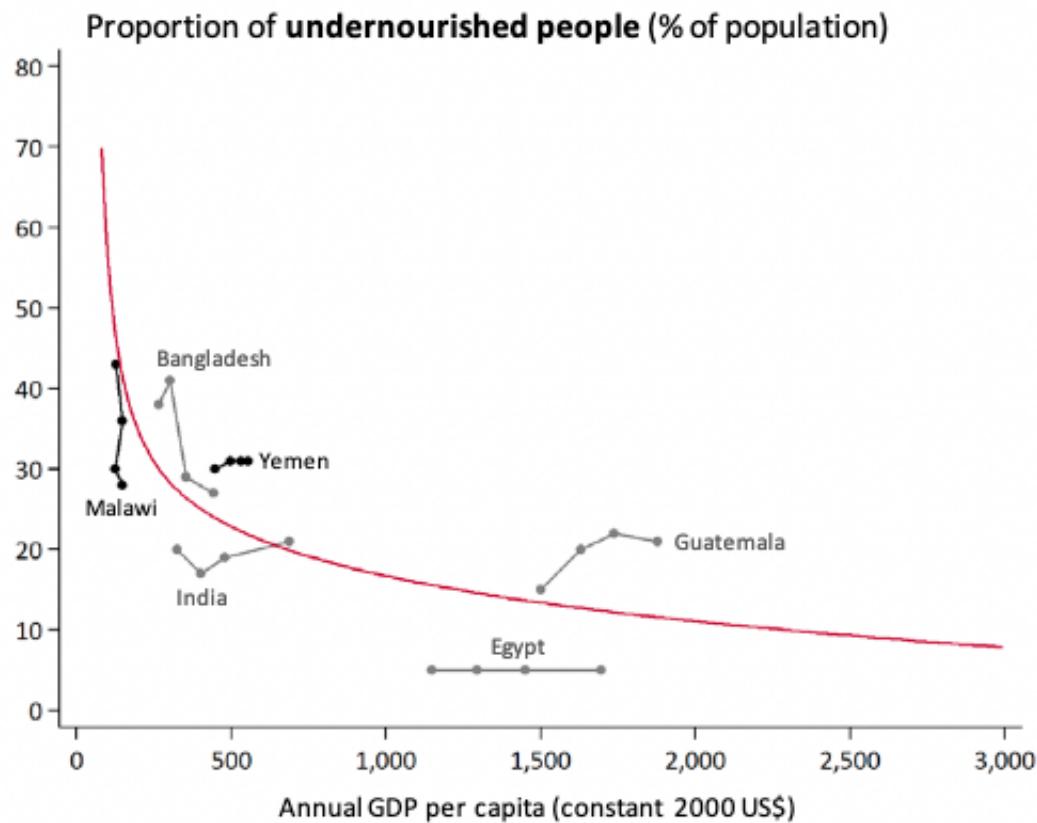
Our World  
in Data



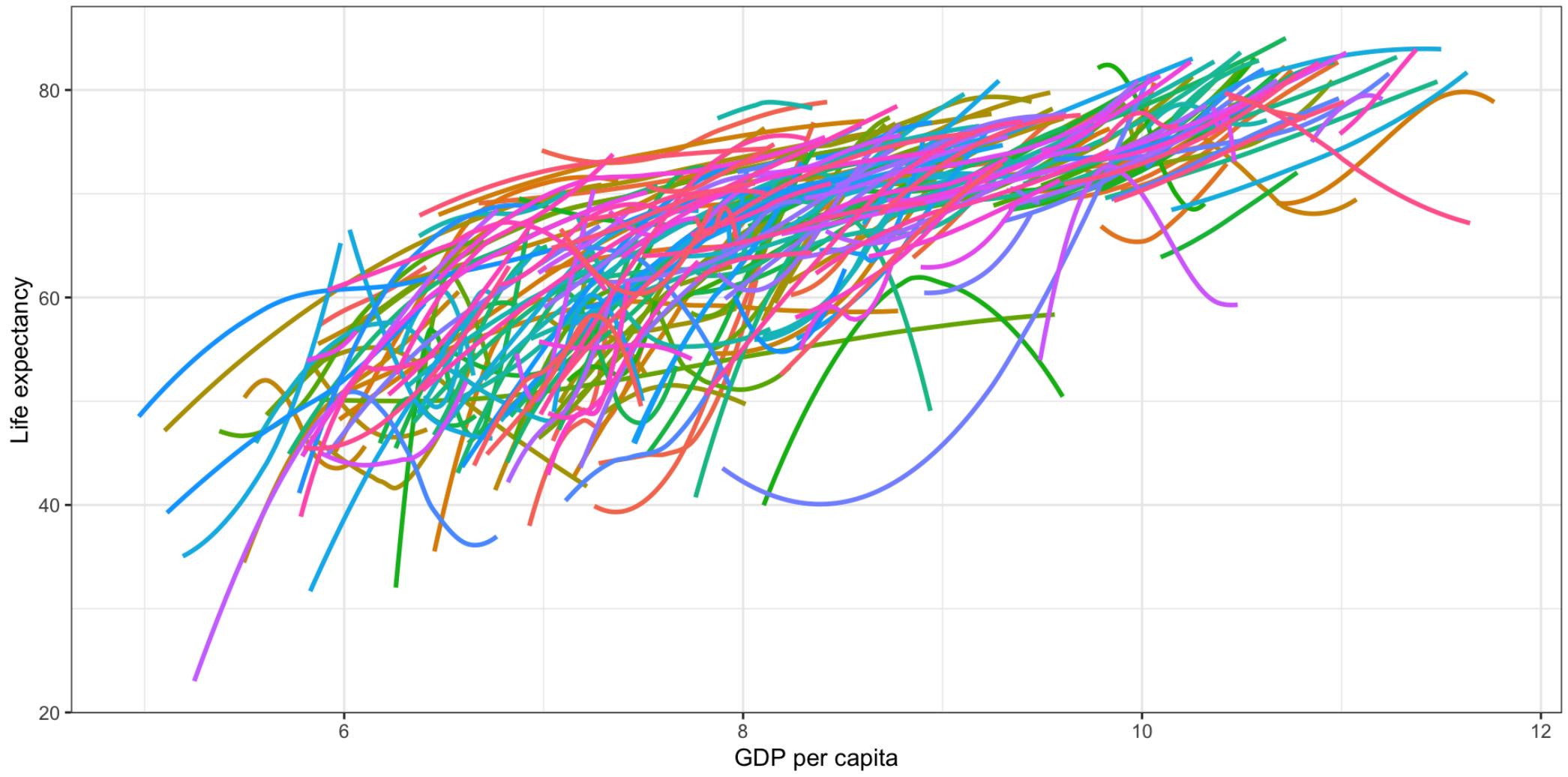
Source: Clark (2008).

Figure: Our World in Data. Source: Bank of England.

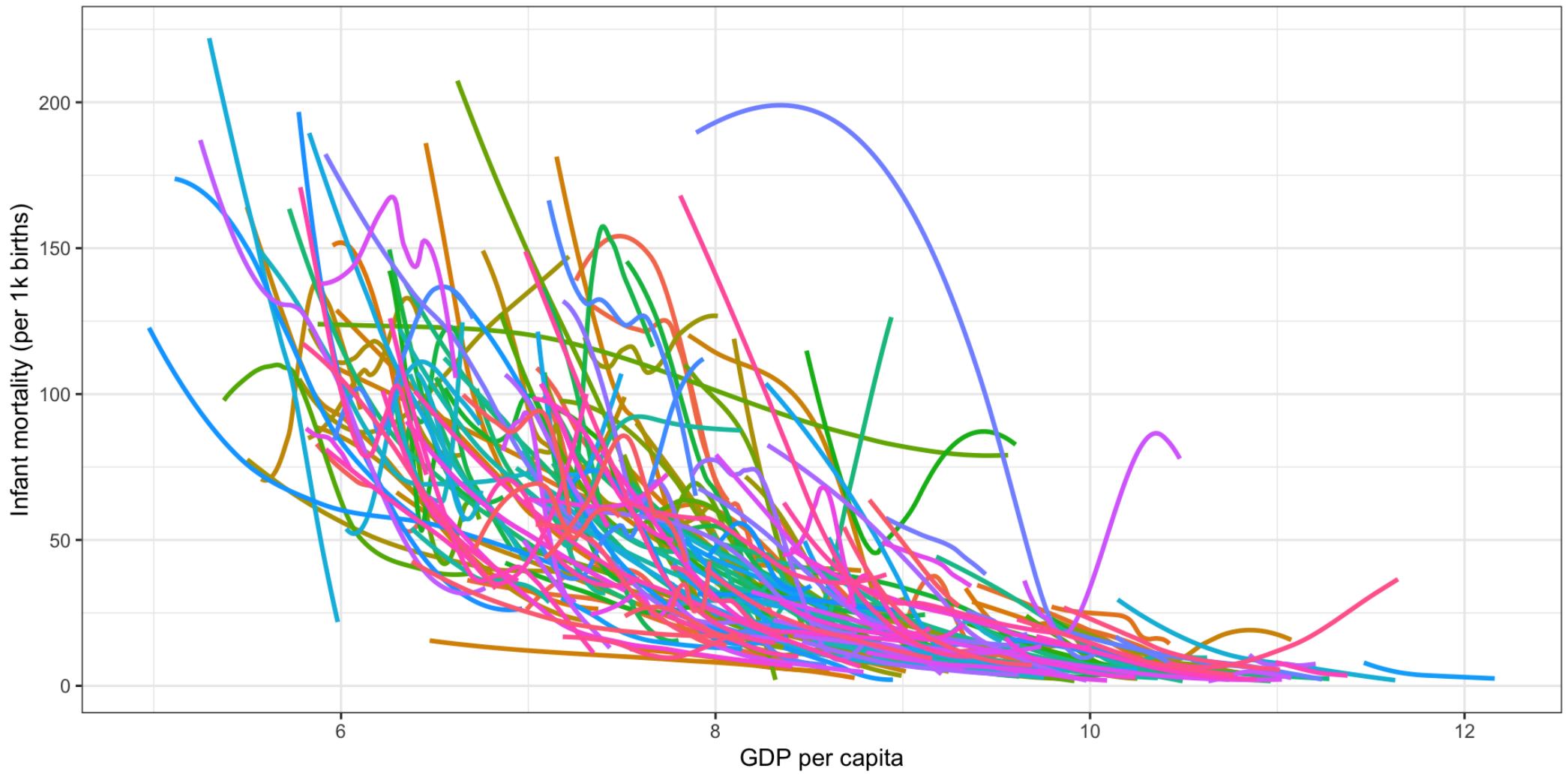
Figure 1: Height



Nutrition. Source: Ecker, Breisinger, and Pauw (2011).

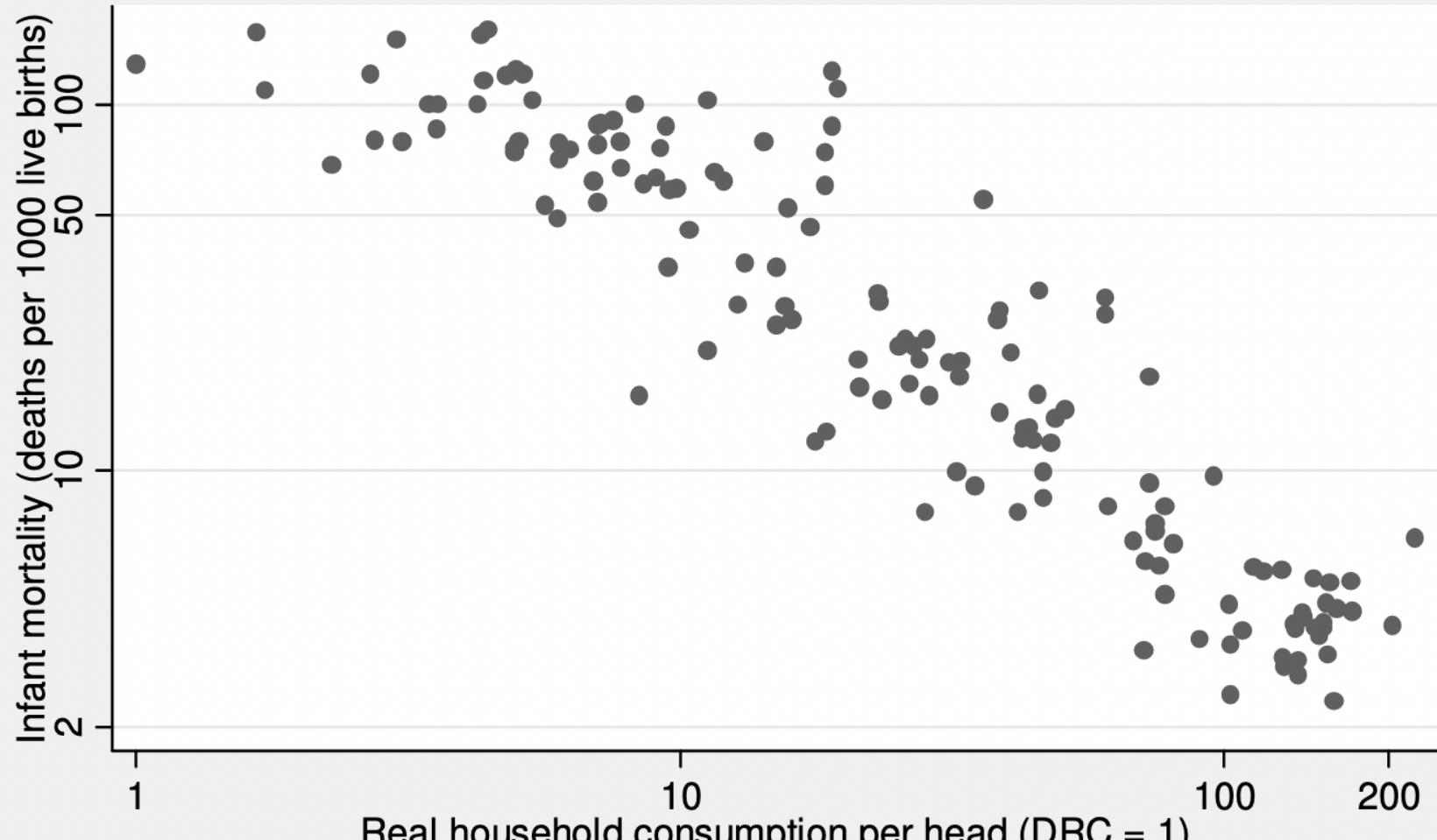


GDP per capita and life expectancy. Figure: Aklin. Source: WDI.



GDP per capita and infant mortality (death per 1,000 births). Figure: Aklin. Source: WDI.

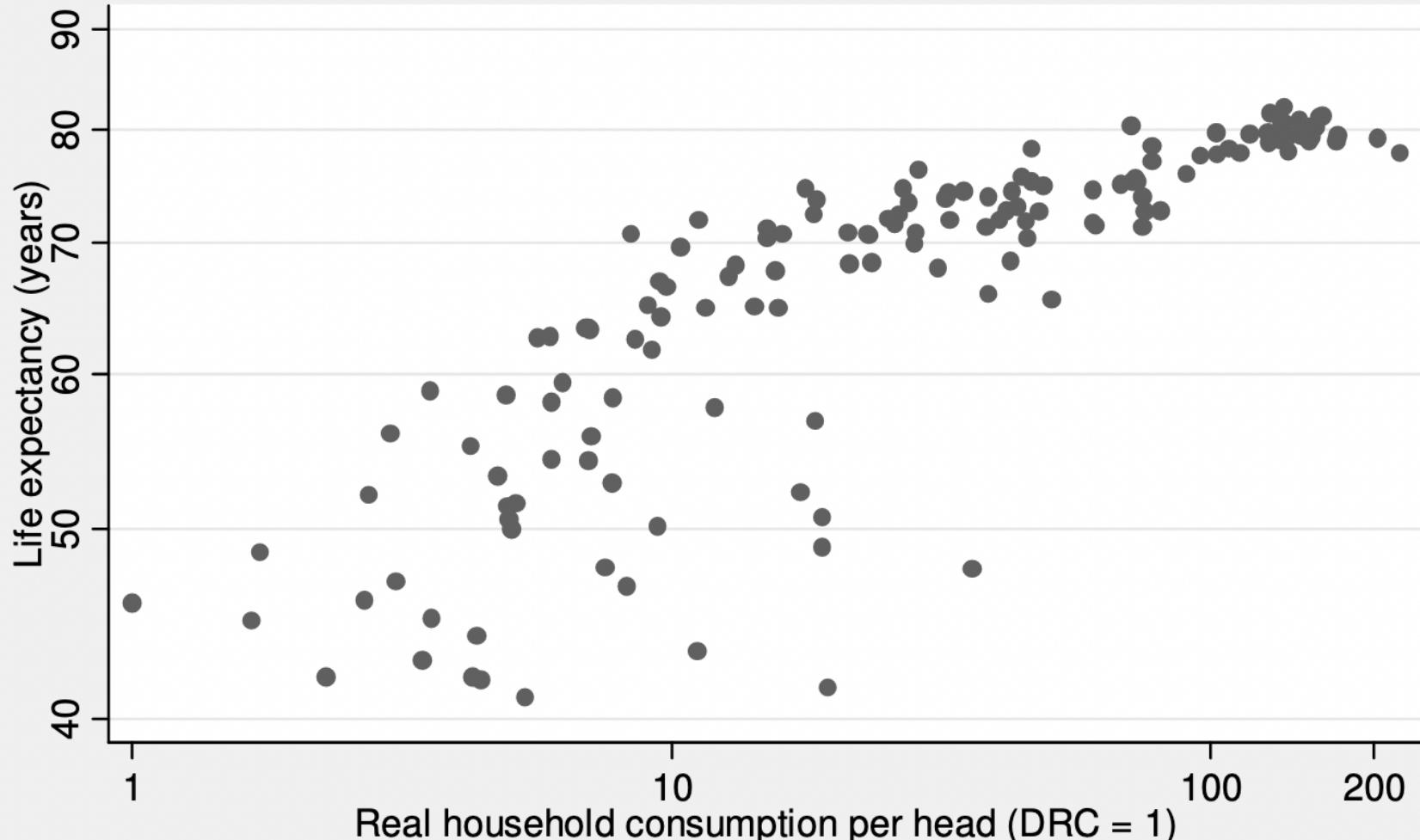
## Infant mortality versus household consumption per head (log scales)



Notes: 146 countries. Household consumption deflated by EKS Fisher PPP.

Source: Oulton ([2012](#)).

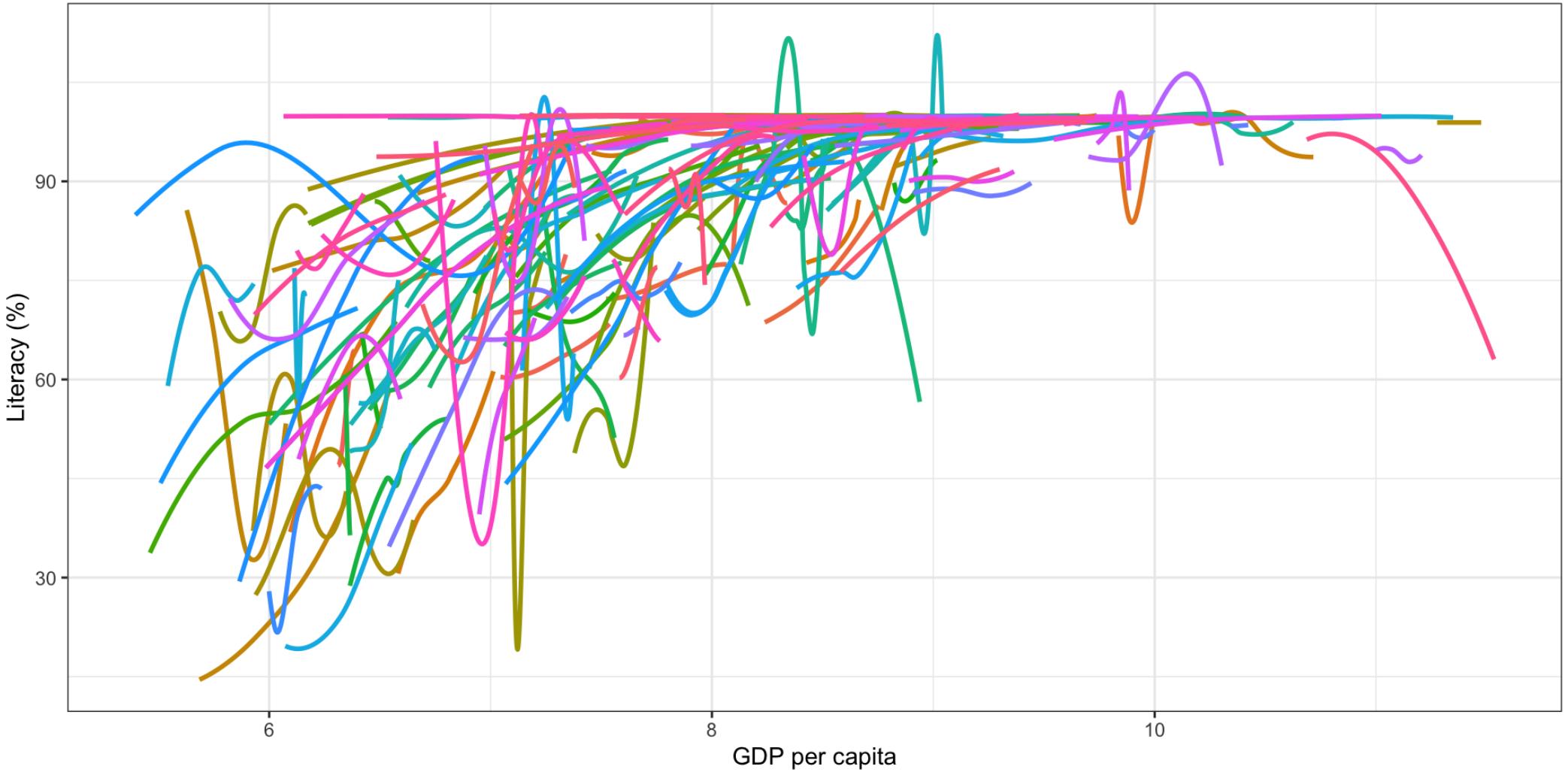
## Life expectancy versus household consumption per head (log scales)



Notes: 144 countries. Household consumption deflated by EKS Fisher PPP.

Source: Oulton ([2012](#)).

# Opportunities



GDP per capita and literacy. Figure: Aklin. Source: WDI.

# Happiness

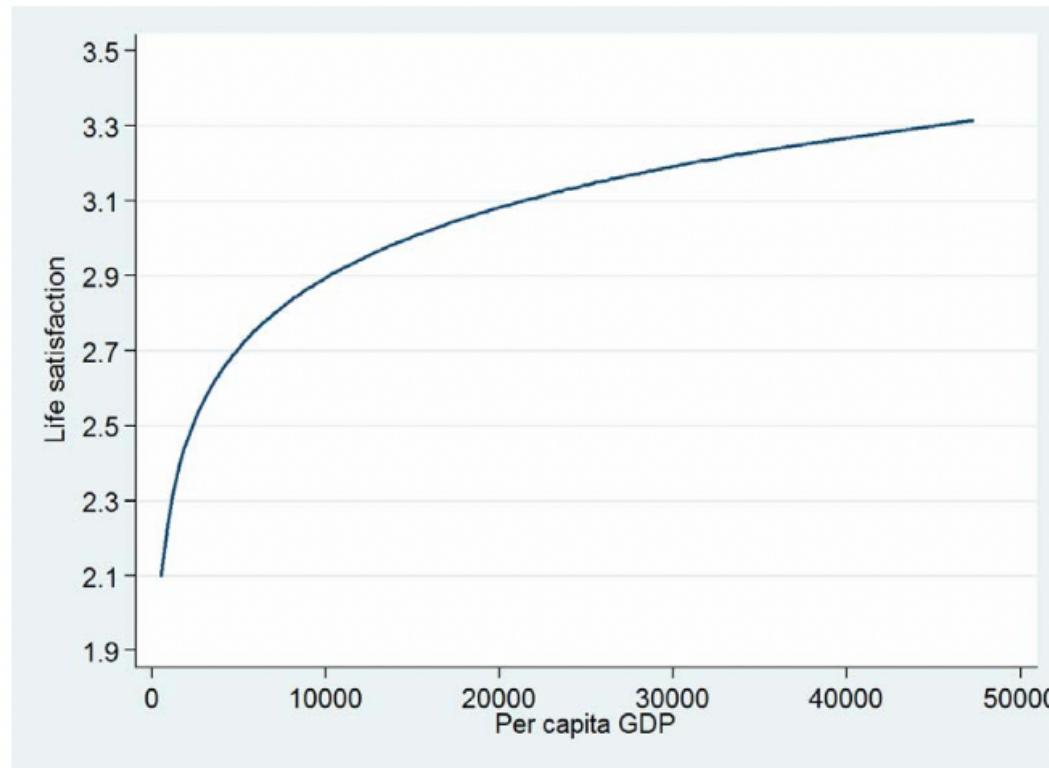
- Happiness: end goal?
  - Locke: yes! Bentham: yes!
  - US declaration of independence: yes!
  - But remember: could be happy for bad reasons
- Does happiness increase with economic development?
  - Yes [within and across countries](#)
  - Not [over time](#)
  - = Paradox of happiness (Easterlin 1974)
  - One explanation: hedonic treadmill

# Individual effect of income

Figure 1

## Diminishing Marginal Utility of Income

[Life Satisfaction and GDP per Capita (Absolute Scale) Based on WVS Cross Section (n=195)]



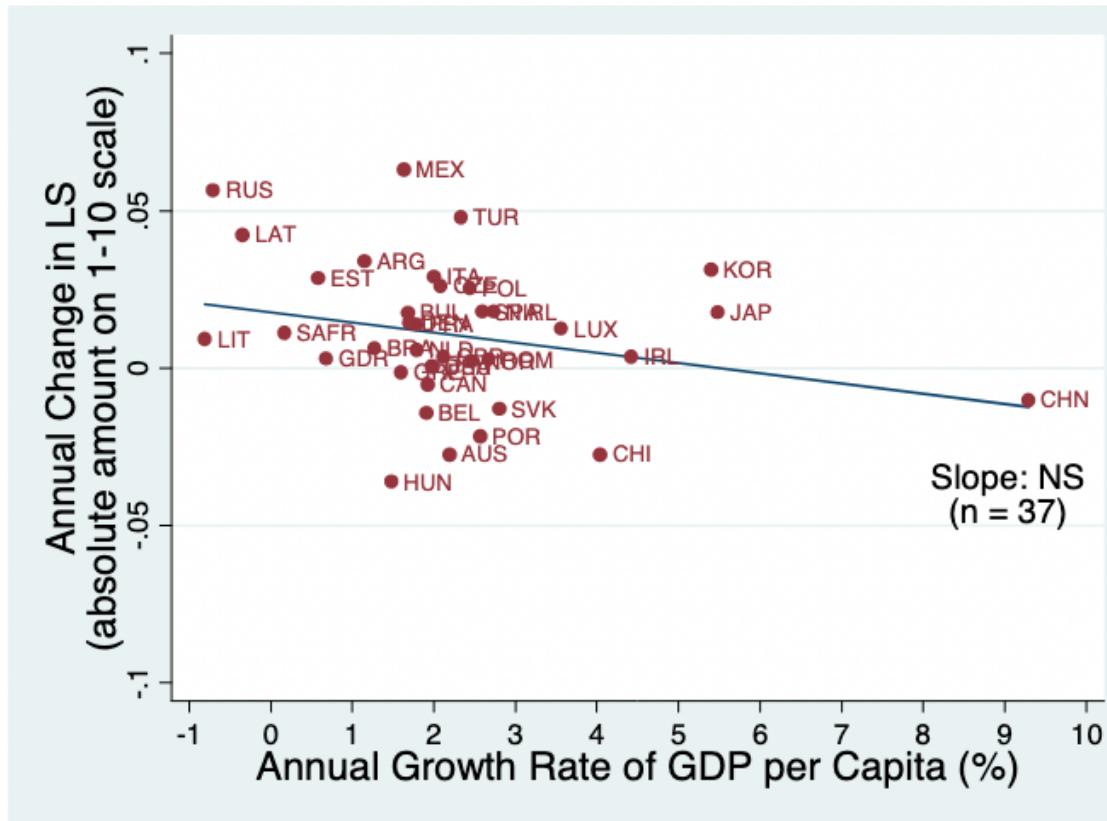
Source: The basic data are 195 pooled observations for 89 countries surveyed in waves 1-4 of the World Values Survey. Individual country observations are omitted from the figure. The fitted regression is  $y = 0.405 + 0.270\ln(x)$  (adjusted  $R^2 = 0.452$ ); t-statistics in parentheses.  
(2.05) (12.68)

Source: Easterlin and Angelescu 2009.

# Aggregate effect of income over time

Figure 6

Longer Term Relationship between Growth Rates of Life Satisfaction and GDP per Capita: 17 Developed, 11 Transition, and 9 Developing Countries (12-34 Years; Mean=22)



Source: See text. The fitted regression is  $y = 0.018 - 0.003x$  (adjusted  $R^2 = 0.069$ ); t-statistics in parentheses.  
(3.07) (-1.61)

Source: Easterlin and Angelescu 2009.

# Summary so far

- a. What we want: improve people's **welfare**
  - Reason: welfare is plausibly a **just** goal!
- b. What determines welfare? **Economic growth/development**
  - Welfare could be equated to well-being
  - Development correlates highly with well-being
  - Thus: development is probably good!
- c. How do we get development? **Technological innovations**

# History of development

# Development vs growth

- **Growth:** increase in prod and diversity of goods and services
- **Development:** deep econ transformation (+pol & social)
  - Example: shift from manufacturing to services
- Note:
  - Growth w/o development is possible
  - Development w/o growth is possible
  - But the two are generally connected

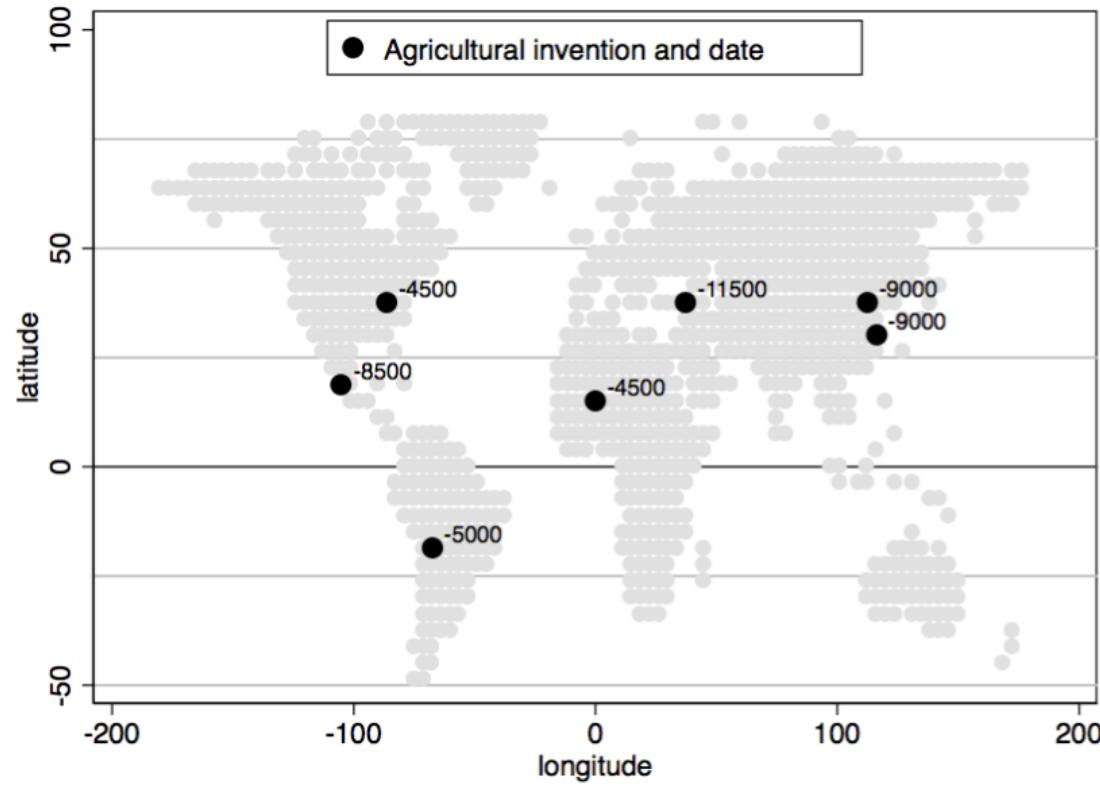
- Development is continuous, but two critical junctures
  1. Neolithic period (“Stone Age”) (~12,000 BCE)
  2. Industrial revolution (~1760-1890s)

# 1. Neolithic revolution

# Pre-neolithic period

- Early homo sapiens: nomadic hunter-gatherers
- Strong limits on population growth
  - Europe: 1 person needed ~4 sq miles
  - Tropical regions: 1 person needed 0.4 sq m
- Implications?
- Small tribes, no surplus, few activities outside of food, no trade, no innovation

# Neolithic period

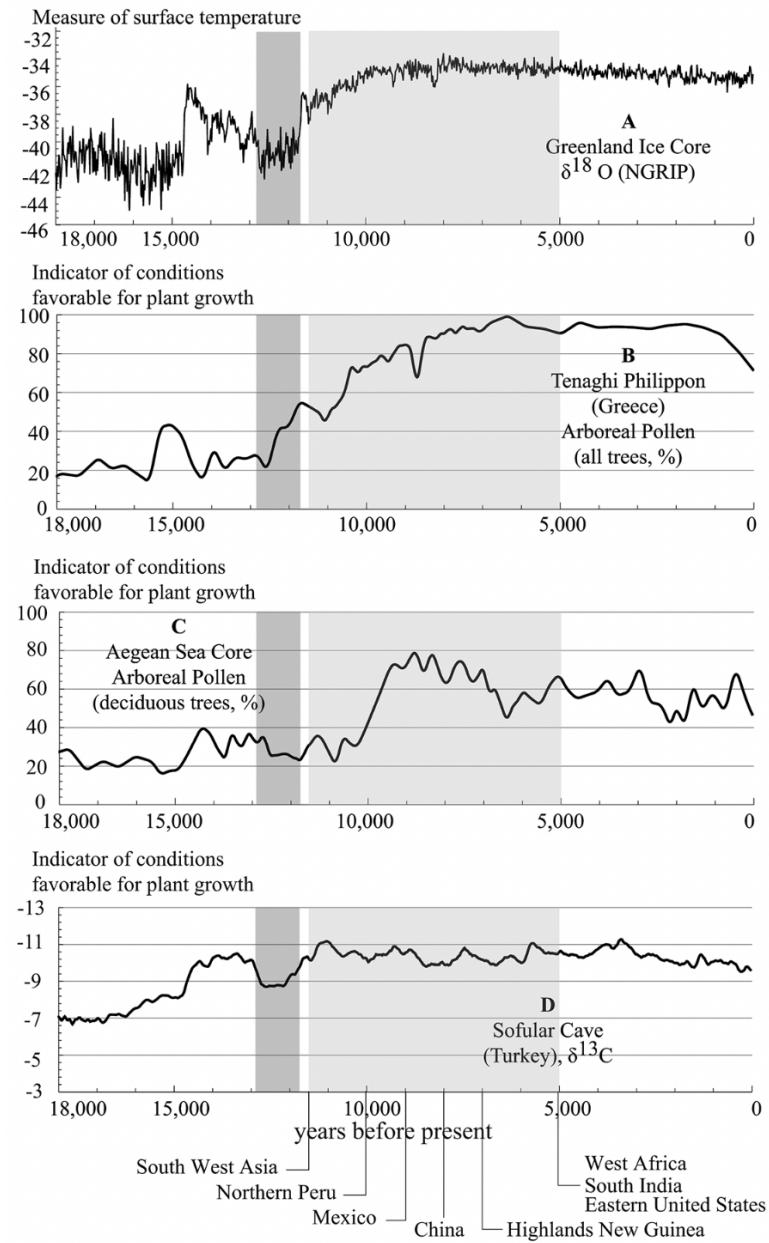


**Figure 2:** The locations where agriculture was invented and their respective dates in years before present.

Source: Matranga (2022).

New technology: agriculture (Bairoch (1997))

- Causes: climatic change
  - End of Last Glacial Period (~12,000 BCE)
  - Higher temperatures = harder to hunt
  - Longer dry season: need food that can be stored
- Additional causes: social development, property rights (animals, storage, gardens)



Source: Bowles and Choi (2019)

# Consequences of Neolithic revolution

- Short term: few benefits (smaller, more joint health issues)
- Long term: radical transformation...
- Population: agri surplus → larger pop
- Labor: non-farming jobs (crafts, trade)
- Social: development of cities: Middle East: ~3500 BCE,  
Harrapa (Punjab, India): ~2000 BCE, China: ~1400 BCE
- Laws and institutions: Hammurabi code (1750 BCE),  
common defense, taxes, etc.
- Civilizations Mesopotamia, Egypt, Greece, Rome

## 2. Industrial revolution

- Period of profound **economic, social, political** transformations (1760-1890)
- Shift from agriculture to industry
  - 1st Industrial rev: ~1760-1800
  - 2nd Industrial rev: 1860-1890
  - Since then: 3rd and 4th IR
- Enabled by new energy tech & services: steam, coal, oil, electricity

# England

	1500	1700	1900	1950
Calories	1.8k	2.2k	3k	3.1k
Life expectancy	34	38	46	69
Location	Rural	Rural	Rural	Urban
Literacy rate	5-15%	~50%	90%+	95%+

# Context

- Neolithic to 1600s: no big trend in living standards for median
- Does *not* mean stability (Black Death:~-50%, Thirty Years War: 4-8m deaths; climate shocks)
- Does *not* mean **stagnation**. Many innovations!
- Medieval Europe:
  - Trade: global trade network (Asia, Americas)
  - Capitalism: banking, accounting, money
  - Technology: agri, paper, medical science, universities

- Change centered around western Europe starting in 1600s (“Age of Reason”)
  - Science: physics, statistics, philosophy (Hume, Descartes)
  - Modern state (property rights+law, “proto-democracy”)
  - Markets

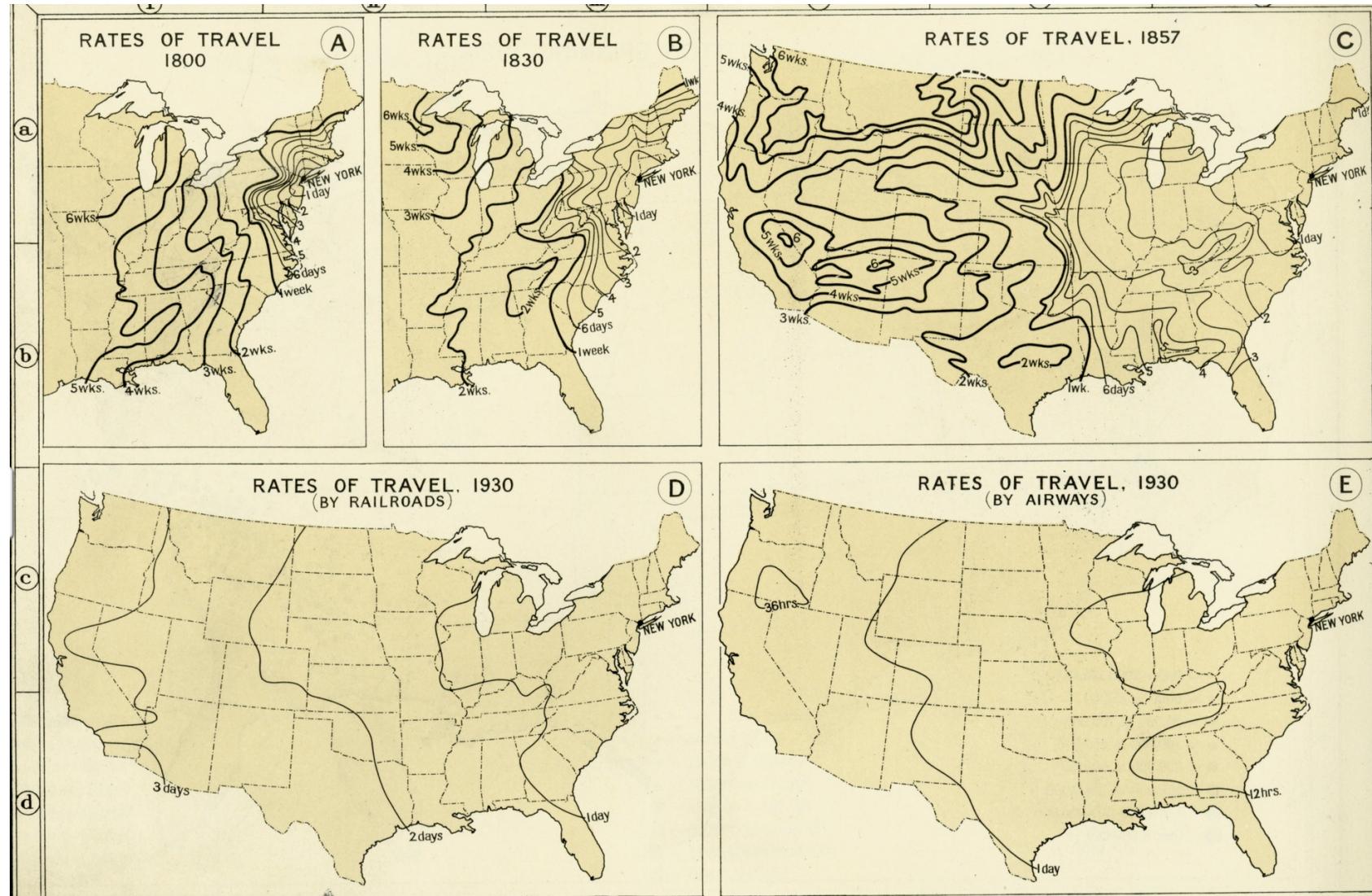
# 1st Industrial revolution

- Starts in UK, 1760s
- Driven by new **innovations** in **energy**
- Cause(s)

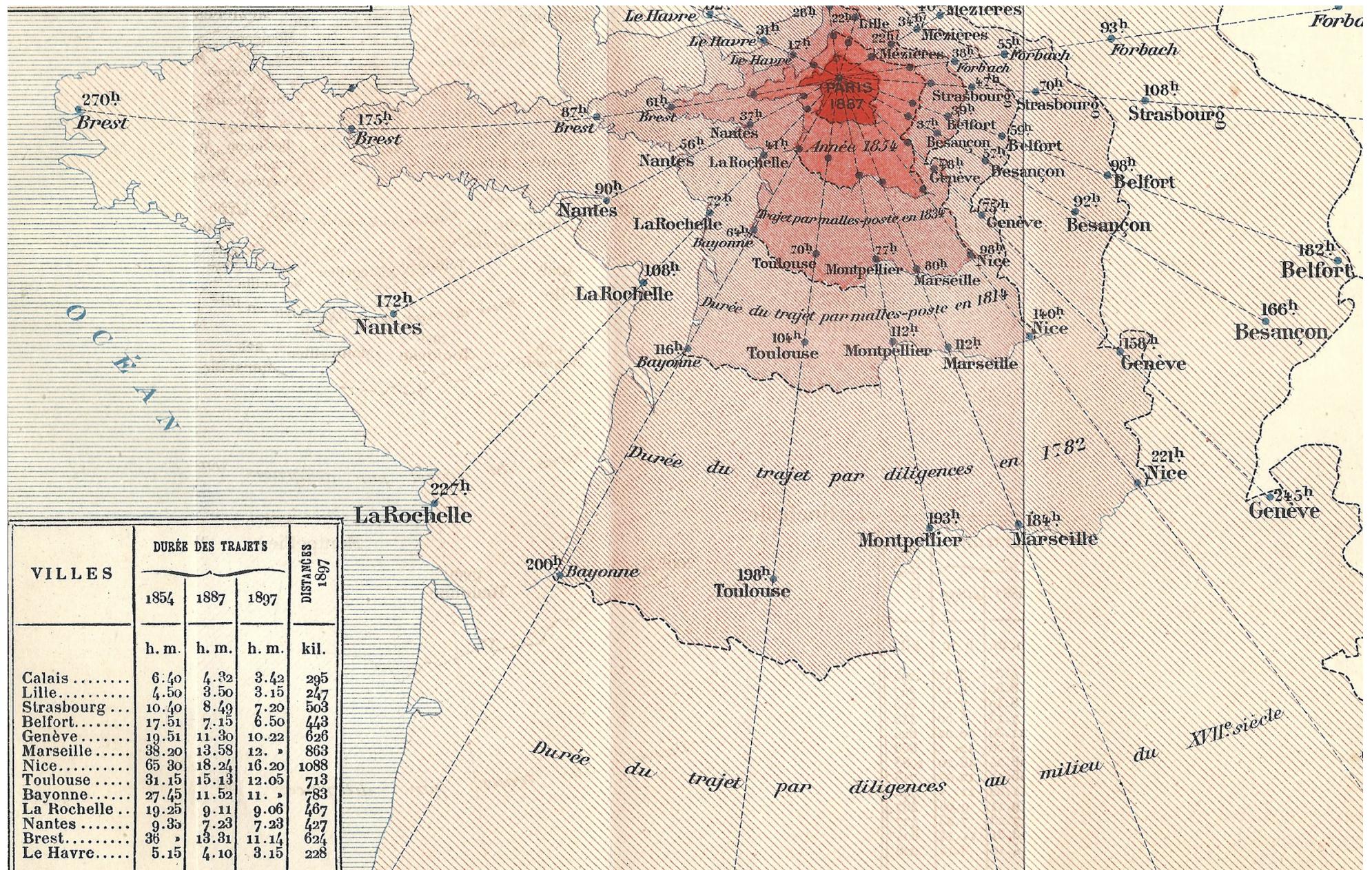
# **2nd Industrial revolution**

What were the consequences  
of the 2nd Industrial revolution?

# World is becoming small



Isochrome map of US. Source: Atlas of the historical geography of the United States



Isochrome map of France

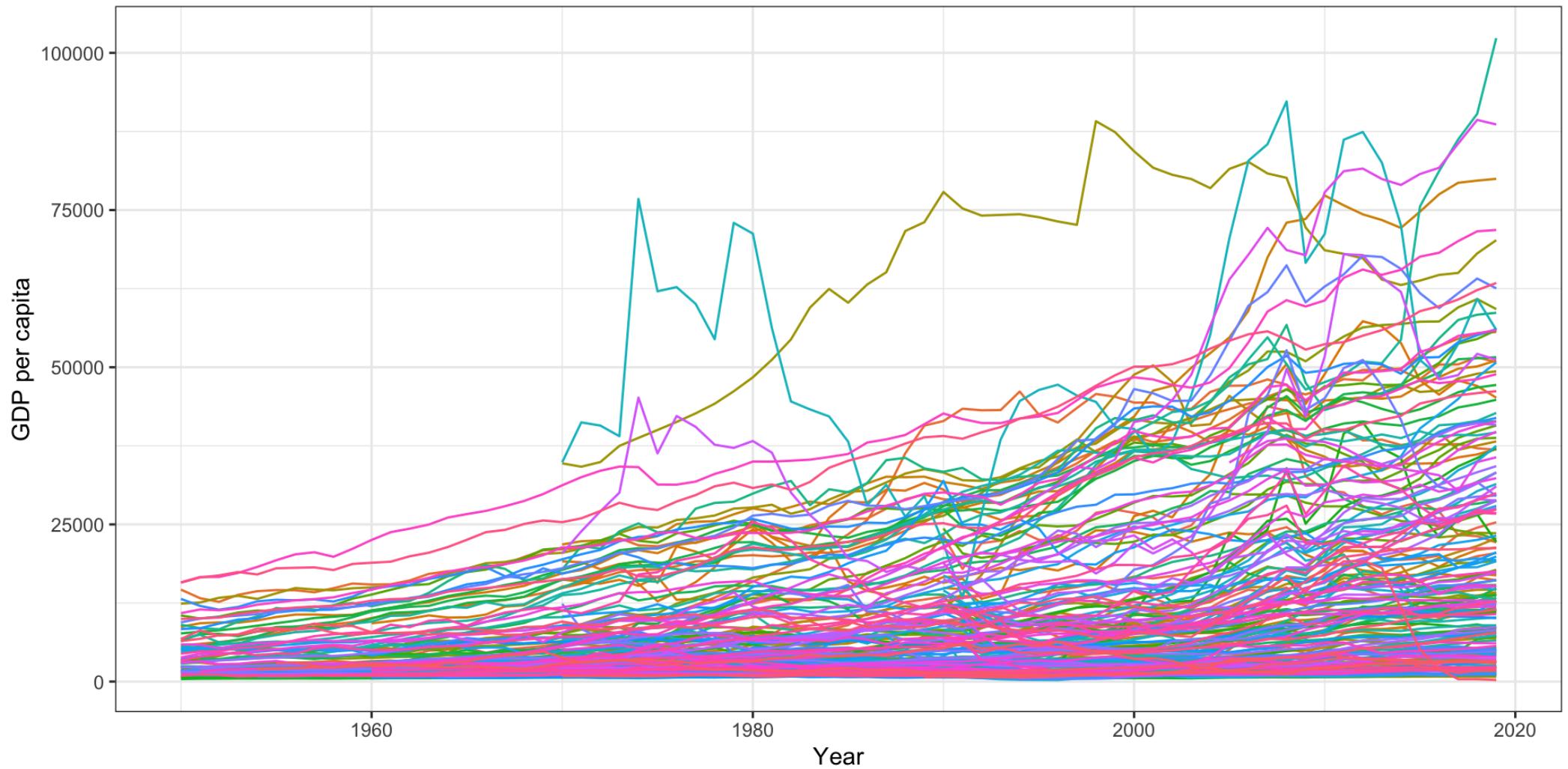
# Some consequences

- Labor market. Eg:
  - UK w/ train station → pop growth + shift male workers away from agriculture
  - Germany: train tracks → pop growth for bigger parishes
- Erasure of local culture. Eg France: 50% of pop doesn't speak French in 1789
- Urbanization: working class, marxism, demand for social protection, education

# **3rd Industrial revolution**

**What's next?**

# GDP/capita since 1950



GDP per capita. Figure: Aklin. Data source: Penn World Tables.

# Conclusion

- Development ≠ economic growth and ≠ linear
- Two key moments: ~12,000 BCE and 1760-1890
  - Neolithic revolution
  - Industrial revolution
- Both: dramatic changes for humanity caused by technology
  - Agriculture (Neolithic)
  - Energy (Industrial revolution)
- Next: the side effects of the Industrial revolution

# Questions?

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Source for title page painting: Jean-François Millet, “The Gleaners”

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