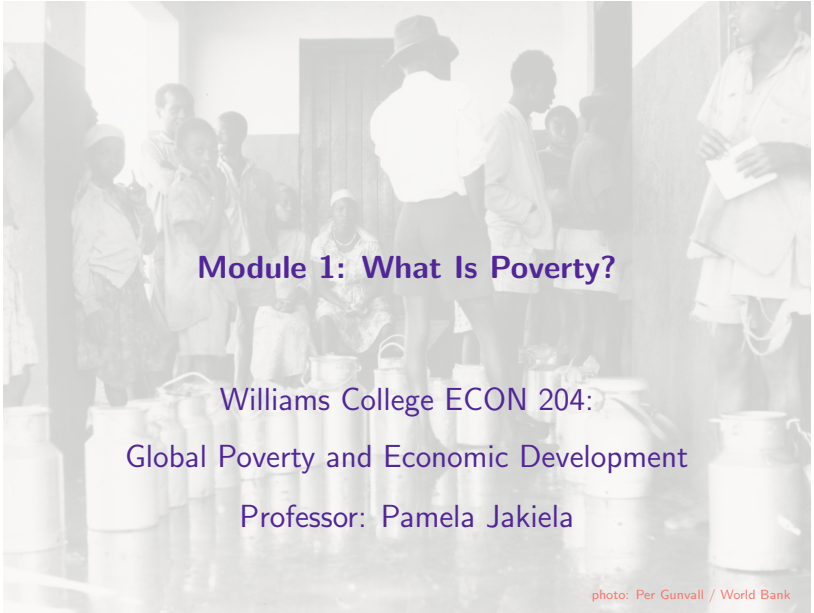


Module 1: What Is Poverty?

Williams College ECON 204:

Global Poverty and Economic Development

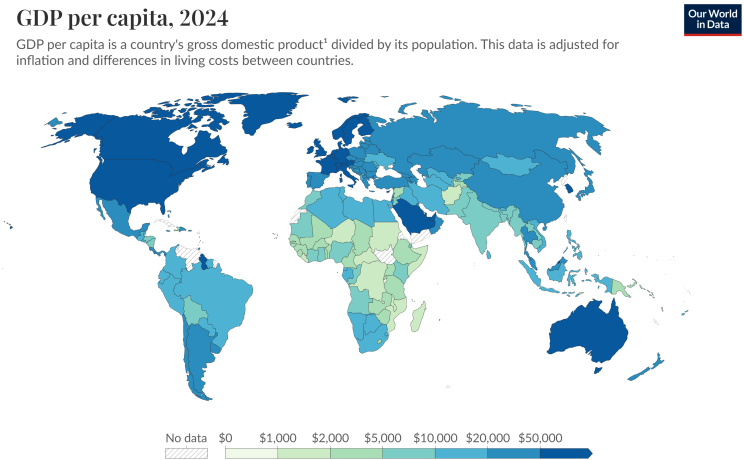
Professor: Pamela Jakiela

photo: Per Gunvall / World Bank

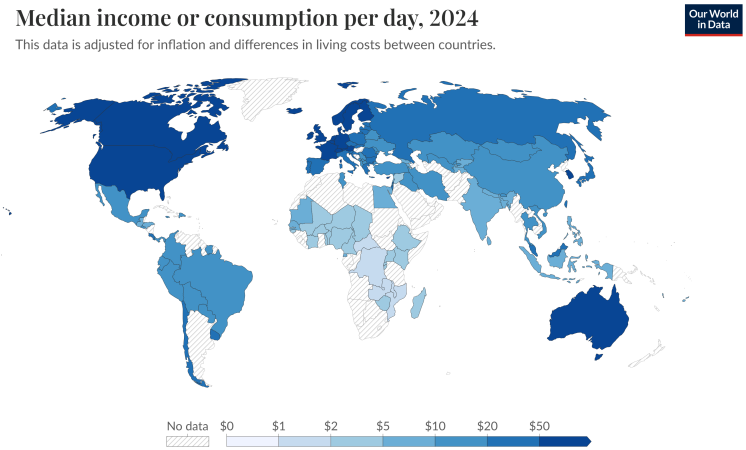
Measuring Living Standards: GDP per Capita

- **Gross Domestic Product (GDP)** is a measure of all the final goods and services produced and sold in an economy, i.e. the monetary value of total market output
  - Gross Domestic Product vs. Gross National Income
- **GDP per capita** is total GDP divided by population, how much is produced per person
- GDP per capita is adjusted for **purchasing power parity (PPP)** to reflect the fact that goods and services, particularly non-tradables, are often cheaper in low-income countries
- GDP per capita is expressed in real rather than nominal terms (e.g. "2011 dollars")
- PPP-adjusted GDP per capita varies by more than a factor of 10 across countries:
  - Burundi: $836 in 2024
  - Singapore: $132,570 in 2024

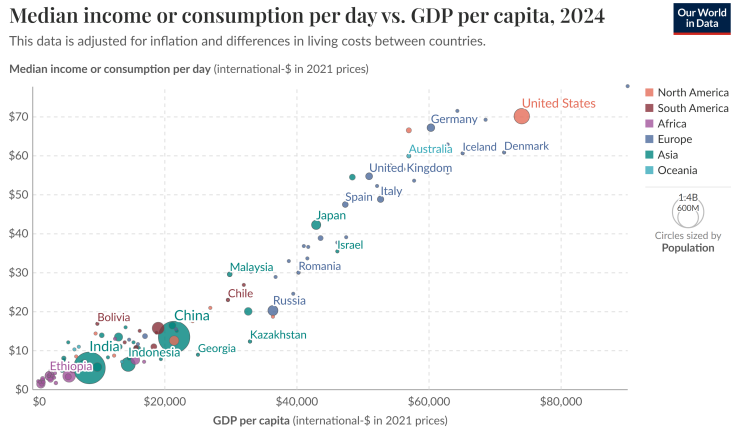
PPP-Adjusted GDP per Capita Around the World



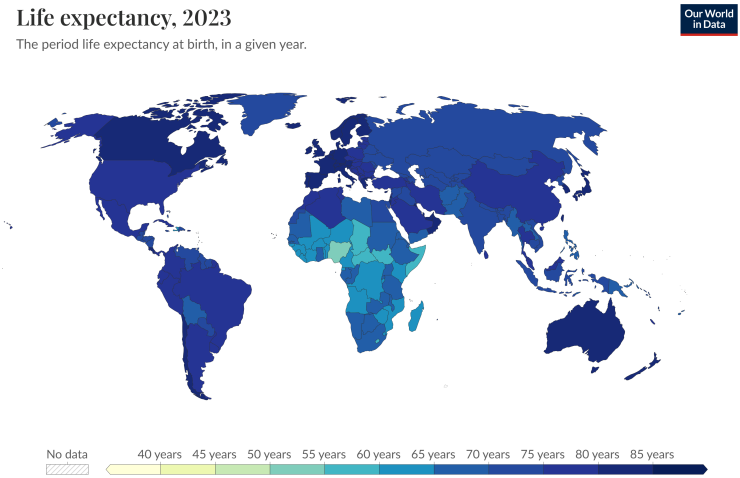
Median Income



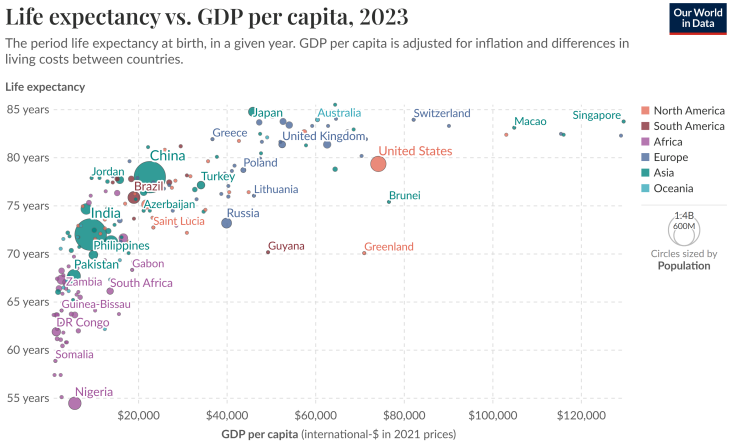
Median Income and GDP per Capita Are Highly Correlated



Life Expectancy



Life Expectancy and GDP per Capita Are Highly Correlated

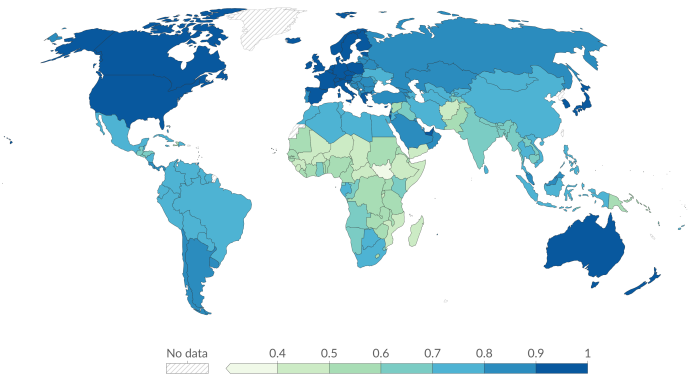


Human Development Index

Human Development Index, 2023

Our World in Data

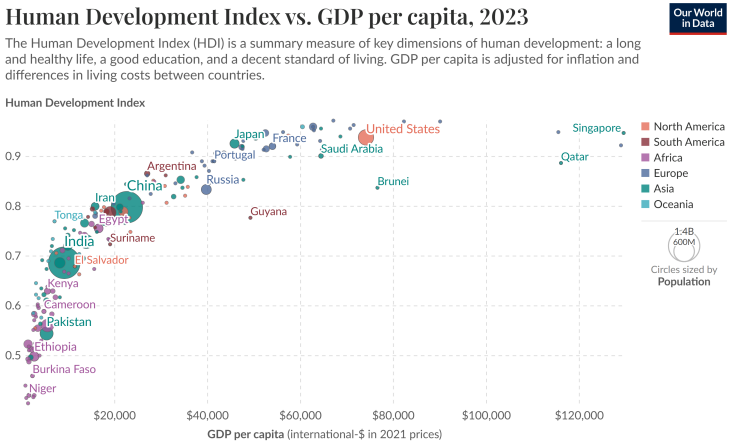
The Human Development Index (HDI) is a summary measure of key dimensions of human development: a long and healthy life, a good education, and a decent standard of living. Higher values indicate higher human development.



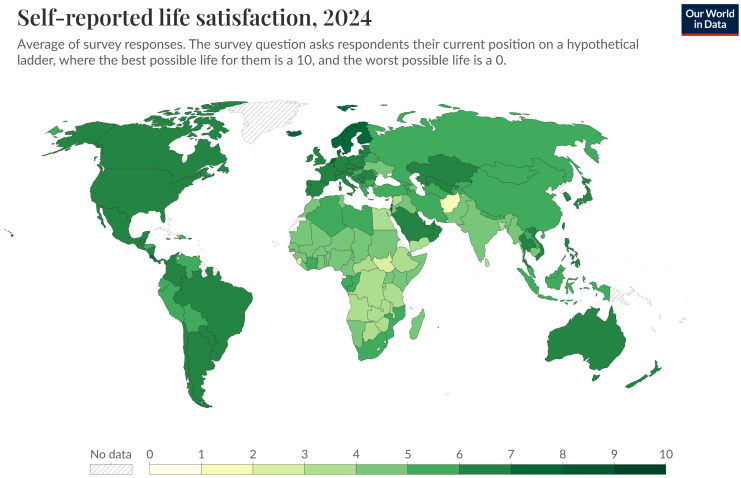
Data source: UNDP, Human Development Report (2025)

OurWorldinData.org/human-development-index | CC BY

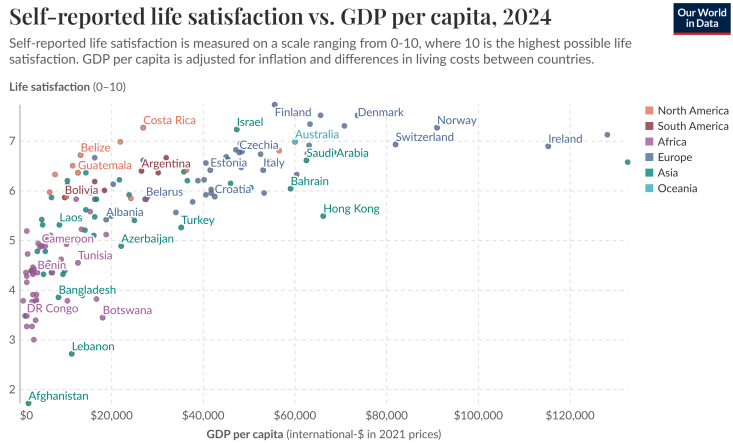
Human Development and GDP per Capita Are Highly Correlated



Life Satisfaction: Measuring Happiness and Subjective Wellbeing



Life Satisfaction and GDP per Capita Are Highly Correlated

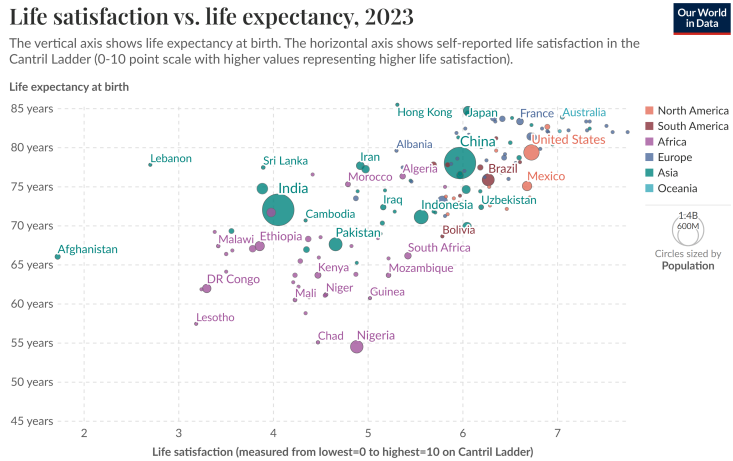


Data source: Wellbeing Research Centre (2025); Eurostat, OECD, IMF, and World Bank (2025)

Note: GDP per capita is expressed in international-$ at 2021 prices.

OurWorldinData.org/happiness-and-life-satisfaction | CC BY

Life Satisfaction and Life Expectancy Are Highly Correlated



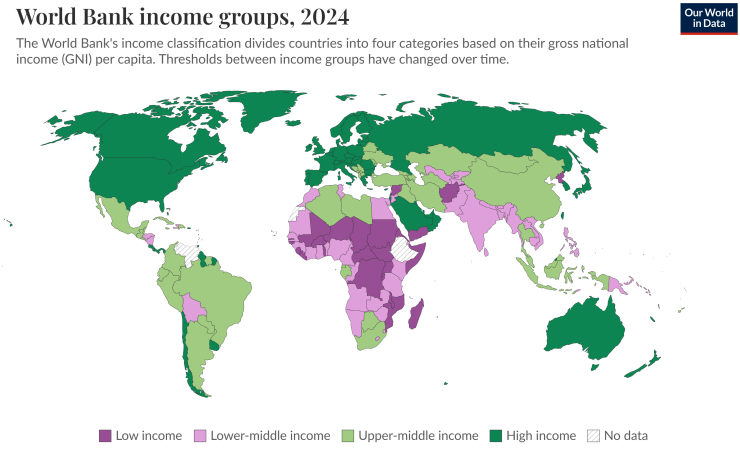
Summary: Alternative Measures of Living Standards

- **Median income/consumption** constructed from household and/or labor force surveys
  - Less subject to outliers than GDP per capita
  - Data is missing for many countries
- **Life expectancy** at birth is the expected lifespan of a child born today if current age-specific mortality rates were to remain constant throughout the child's life
  - Major drivers: infant mortality and maternal mortality
- The UN's **Human Development Index (HDI)** aggregates life expectancy at birth, current and expected educational attainment, and income (GNI) per capita
- Cantril's Ladder of Life captures **life satisfaction**, happiness, and subjective wellbeing

Country-Level Measures of Living Standards Are Correlated

	Maximum		Minimum		Ratio
GDP per capita	Singapore	$132,570	Burundi	$836	158
Median income/consumption	Luxembourg	$89.49	DRC	$1.32	67.8
Life expectancy	Monaco	86.4	Nigeria	54.5	1.6
Human Development Index	Iceland	0.972	South Sudan	0.388	2.5
Life satisfaction	Finland	7.74	Afghanistan	1.36	5.7

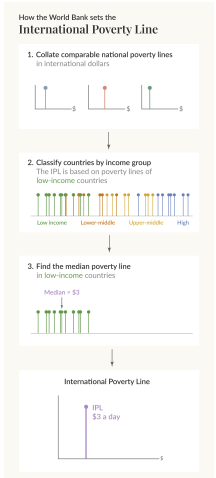
Low-Income, Middle-Income, and High-Income Countries

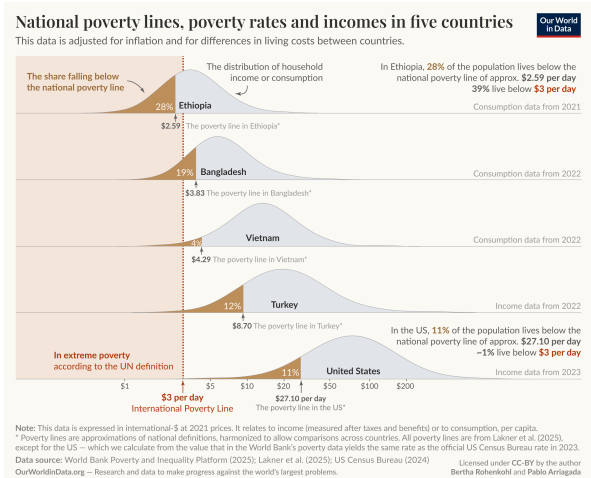


How the World Bank Measures Extreme Poverty

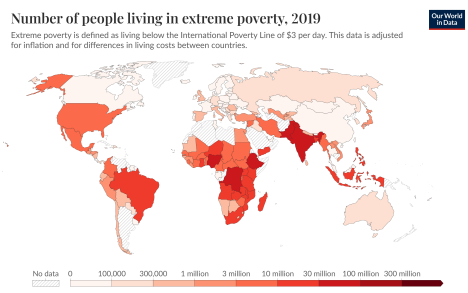
- Poverty lines were originally constructed in the UK and US to reflect the minimum income needed to obtain basic necessities, either calories or calories plus shelter, heat, etc.
- They are used to classify individuals and households, and to compare across regions
- Countries define their own poverty lines (e.g. $15,650 for a single person in the US), reflecting prevailing views of how much income is needed to meet (perceived) basic needs
  - Even after adjusting for purchasing power parity, **relative poverty** lines are higher in high-income countries (HICs) than in low- and middle-income countries (LMICs)
- Martin Ravallion introduced the idea of an international measure of **extreme poverty**
  - $1 per day, then $1.08 per day, then $1.90 per day, then $2.15 per day, now $3.00 per day
    - Adjustments reflect both inflation and changes in living standards in low-income countries
  - Reflects the fact that most of the world is poor by US (or Luxembourg) standards
  - Those in extreme poverty often lack calories, shelter, water, power, schools, healthcare, etc.

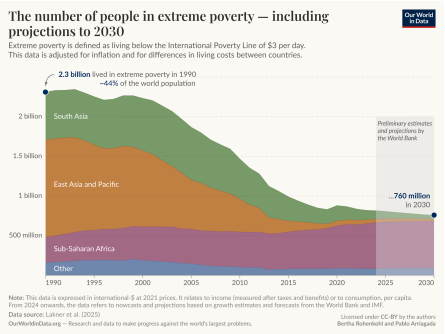
Relative Poverty vs. Absolute Poverty vs. Extreme Poverty





The Changing Distribution of Extreme Poverty

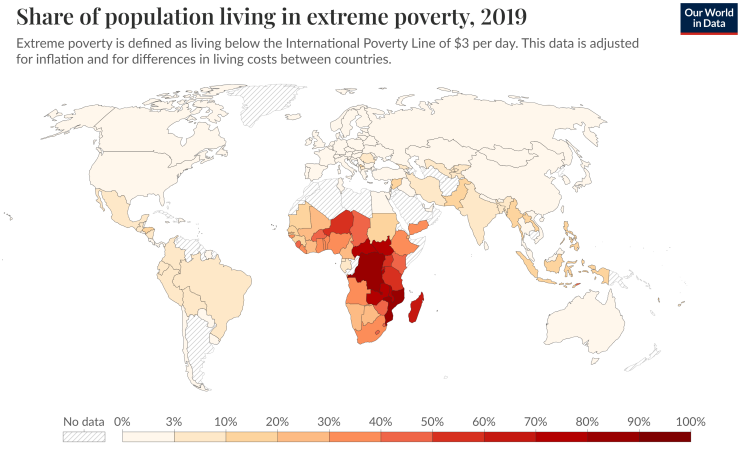




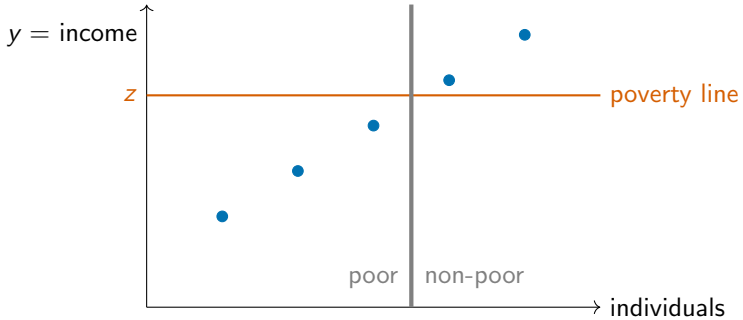
The Changing Distribution of Extreme Poverty

- No high-income country except the US has millions of people in extreme poverty
- Roser (2021): "The poorest people today live in countries which have achieved no growth"
- Page and Pande (2018) dispute this, pointing out that eight middle-income countries (China, India, Indonesia, Nigeria, Pakistan, the Philippines, South Africa, and Zambia) each account for more than one percent of the world's (less than $1.90 per day) poor
  - Many "countries which have achieved no growth" are fragile/conflict-affected states (FCS)
  - Binyavanga Wainaina: "Never have a picture of a well-adjusted African on the cover of your book, or in it, unless that African has won the Nobel Prize. An AK-47, prominent ribs... If you must include an African, make sure you get one in Masai or Zulu or Dogon dress."

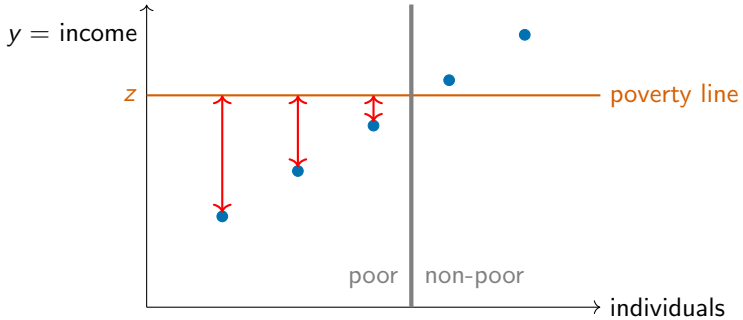
Poverty Headcount Ratio



Measuring Poverty: The Headcount Ratio



Measuring Poverty: The Poverty Gap Index



Measuring Poverty

- The **poverty headcount ratio** is the percentage of a population below the poverty line:

$$HC = \frac{N_{poor}}{N} = \frac{1}{N} \sum_{i=1}^{N_{poor}} 1$$

- The **poverty gap index** is a measure of the depth of poverty:

$$PG = \frac{1}{N} \sum_{i=1}^{N_{poor}} \left(\frac{z - y_i}{z} \right)$$

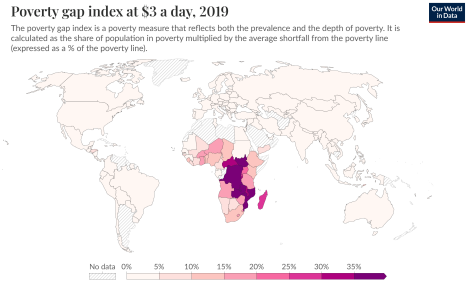
  where z is the poverty line and y_i is individual i's income or consumption level

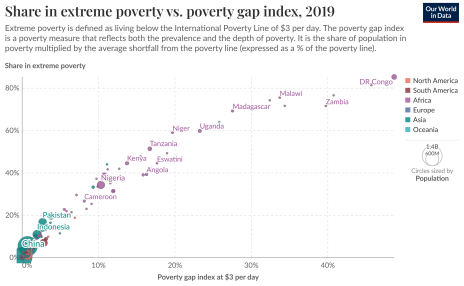
- Both can be expressed as either a percentage (0 to 100) or a proportion (0 to 1)

Measuring Poverty: Comparing Approaches

- When would the headcount ratio be equal to 0?
- When would the poverty gap index be equal to 0?
- When would the headcount ratio be equal to the poverty gap index?
- If you had one million dollars to spend reducing poverty by making direct transfers (of $) to poor individuals, what should you do to reduce the headcount ratio as much as possible?

Measuring Poverty: Comparing Approaches





Summary: Extreme Poverty in 2026

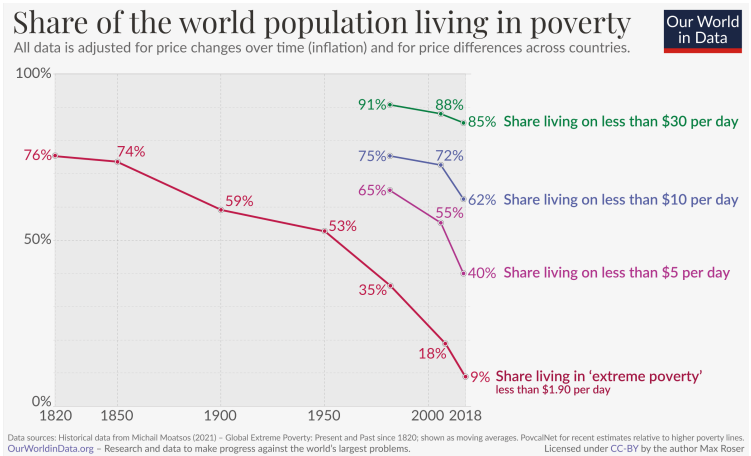
Over 800 million people around the world are living on less than $3 per day

- Two thirds of the world's extremely poor people live in Sub-Saharan Africa, and African countries tend to have the highest poverty headcounts and the largest poverty gaps
  - Exceptions include Haiti, East Timor, Papua New Guinea, Yemen, Afghanistan
- India, Pakistan, Indonesia, and the Philippines also contain large numbers of extreme poor

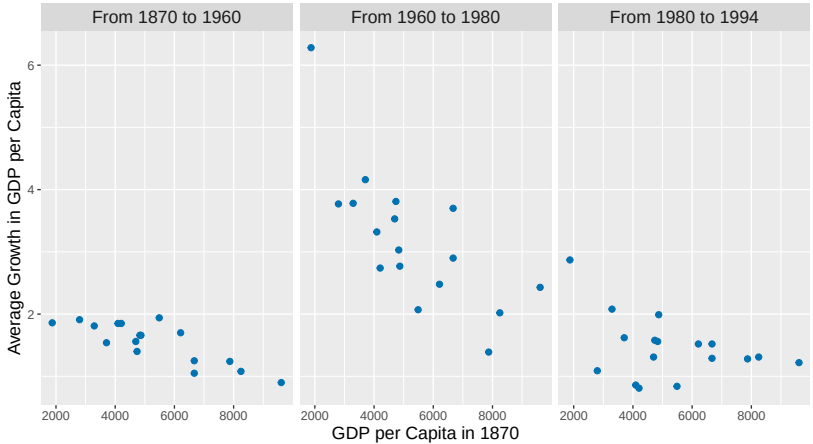
The number of people in extreme poverty declined by more than 50% between 2000 and 2015

- There were over 2.2 billion extreme poor in 2000, down to only about 1 billion by 2015
- The largest gains were in the East Asia and Pacific and South Asia regions, where the number of people living in extreme poverty declined by almost 75% over those 15 years
- Progress against extreme poverty has slowed since then

Poverty Reduction in Historical Perspective



GDP Growth in Historical Perspective: Pritchett (1997)



Sample: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, USA

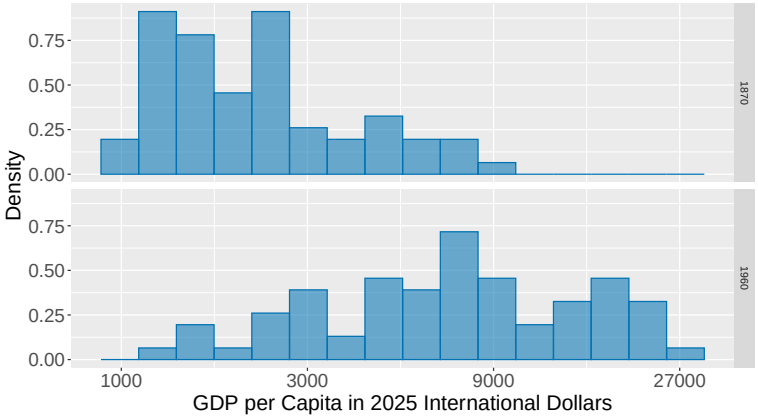
Convergence

Pritchett (1997) shows evidence of convergence among rich countries between 1870 and 1960

- Currently rich countries that were initially poorer...
- Many economic theories as to why this might be the case (Solow, Gershenkron)
- In what sense is convergence among (currently) high-income countries tautological?

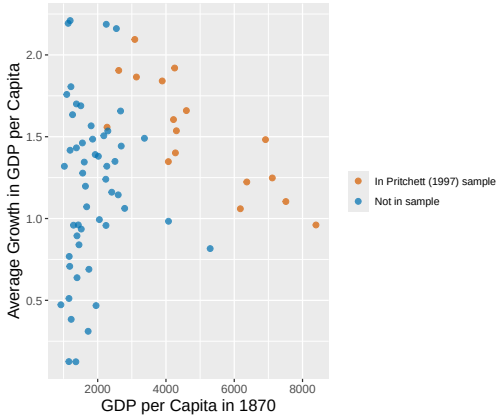
How do we know that poor countries (today) were not growing as fast as wealthy countries?

Substantial Growth in GDP per Capita Between 1870 and 1960

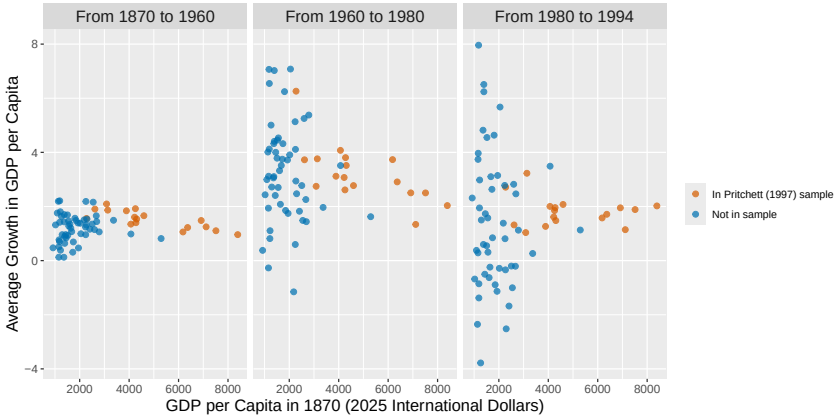


Data from Bolt and Van Zanden (2024), sample includes $N = 69$ countries

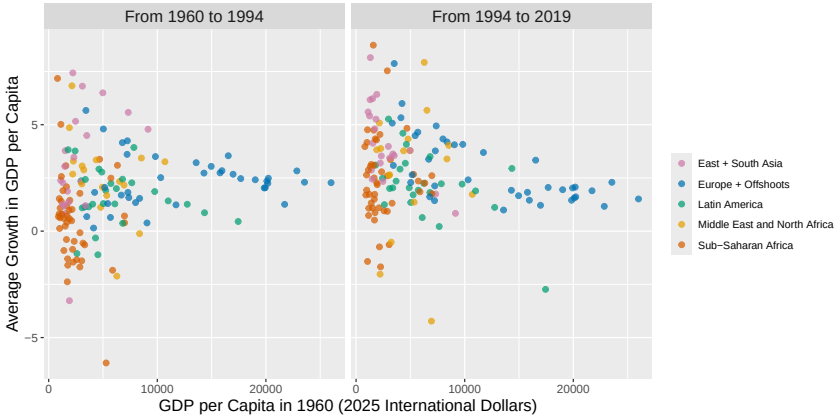
No Overall Pattern of Convergence Between 1870 and 1960



No Overall Pattern of Convergence Between 1870 and 1994



Convergence Between 1960 and 2019?



How Much Would It Cost to End Extreme Poverty?

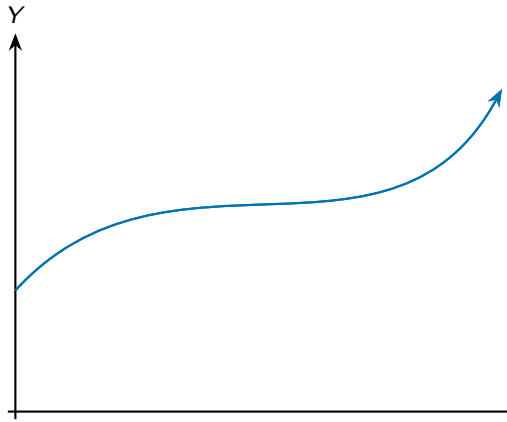
Giving every poor person $1,095 would end extreme poverty (mechanically, for this year)

- In practice, we (and poor country governments) don't know who is poor
- Transfers are often made based on **proxy means testing**
  - Do your (obvious, measurable) durable assets suggest that you are poor?
  - Targeting based on proxy means testing leads to errors of inclusion and exclusion

Paul Neihaus and colleagues frame this as a big data problem: how much would it cost to end extreme poverty if you used widely available (e.g. census) data to predict who is poor

- Use nationally-representative income/consumption surveys to see how well targeting works
- Define a mapping from observable assets to government transfers

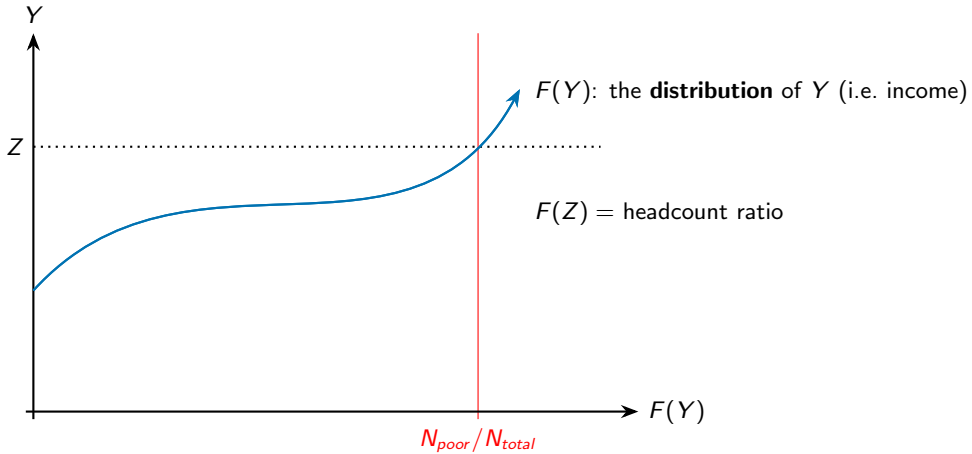
The Distribution of Income



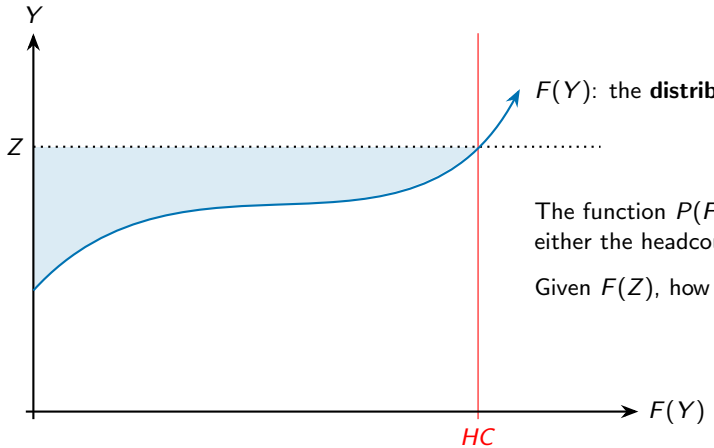
$F(Y)$: the **distribution** of Y (i.e. income)

For every income level Y,
$F(Y)$ tells us the proportion of people with income less than or equal to Y

Poverty Measures



Poverty Measures

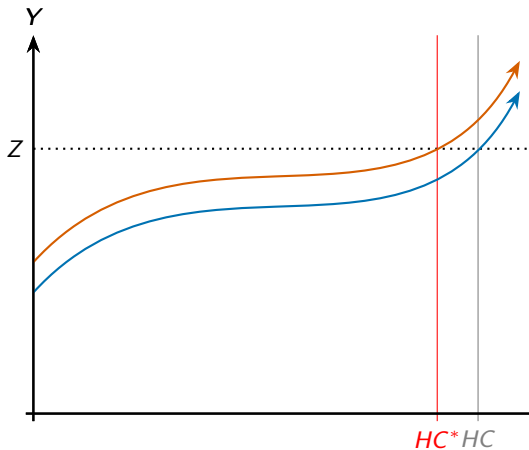


$F(Y)$: the **distribution** of Y (i.e. income)

The function $P(F(Z))$ is a poverty measure either the headcount or the poverty gap

Given $F(Z)$, how much poverty is there?

Government Transfers Shift the Income Distribution



$t(X_i)$ is a government transfer (given X_i)

$Y_i^* = Y_i + t(X_i)$, post-transfer income

$F(Y^*)$ is the new income distribution

The Social Planner's Problem

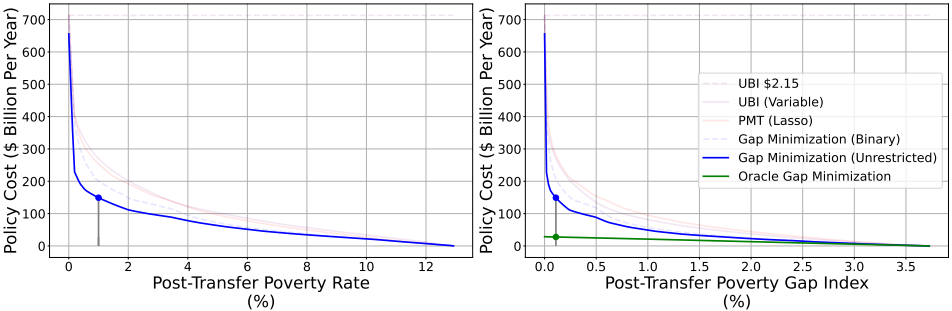
The social planner wants to minimize poverty, i.e. they want to solve

$$\min P\left(F(Y^*)\right) \text{ subject to } \sum_i t(X_i) \leq B \text{ and } t(X_i) > 0 \text{ for all } i$$

where:

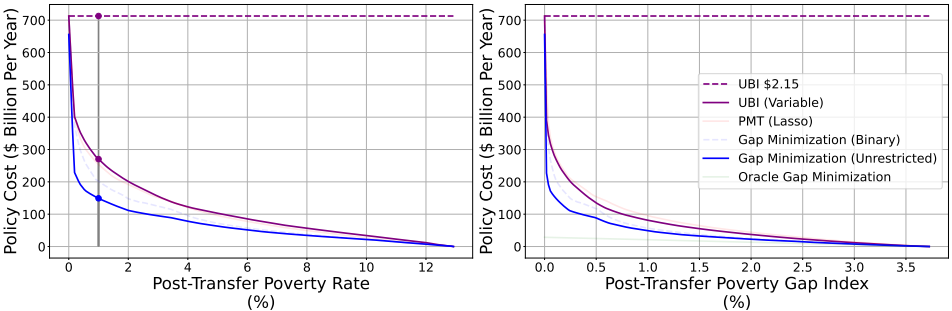
- $F(Y)$ is the distribution of income before government transfers
- X_i is the data we have about individual or household i (e.g. assets)
- $t(X_i)$ is a transfer function that tells us how much to transfer to i given X_i
- $Y_i^* = Y_i + t(X_i)$ is post-transfer income, and $F(Y^*)$ is the new income distribution
- $B > 0$ is the budget for all transfers

How Much Would It Cost to End Extreme Poverty?



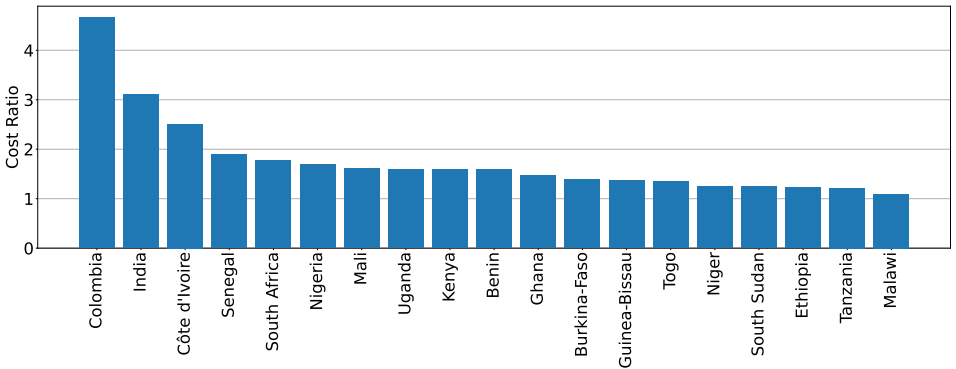
Source: Sahoo, Blumenstock, Selker, Neihaus, and Wager (2025)

How Much Would It Cost to End Extreme Poverty?



Source: Sahoo, Blumenstock, Selker, Neihaus, and Wager (2025)

Cost Relative to Universal Basic Income



Source: Sahoo, Blumenstock, Selker, Neihaus, and Wager (2025)

Is This Feasible?

Estimating (via extrapolation) the cost of achieving a *global* poverty rate of 1%,

0.30%	**cost / GDP**
0.21%	**ODA / GDP**

Source: Sahoo, Blumenstock, Selker, Neihaus, and Wager (2025)